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ELECTRIC RAILWAY JOURNAL

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SEATTLE
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MILLER
TROLLEY
SHOES

are used in this high-speed
service of the Pacific-
Northwest Traction
Company

Special Advantages Shown

Officials of this Company say that Miller Trolley shoes "give much better and more constant contact,"—"*easier on motors*"—"head-light is very steady"—and add in conclusion—"we much prefer the trolley shoe to the ordinary trolley wheel."

Try them yourself!

MILLER TROLLEY SHOE CO.
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1590 Old Colony Bldg., Chicago, Ill.

THE HECKMAN BINDERY, INC. N. MANCHESTER, INDIANA

VISION

The Virginian Railway

Present—Steam	**Future—Electric**
Heaviest Mallet Locomotives. Largest capacity rolling stock. Heaviest tonnage trains. Attractive C.T. costs.	50% increase in size of trains. 100% increase of speed on grades. 200% increase in power capacity per train. 100% approximate increase in tonnage movement.

This will be realized by the Virginian Electrification without an increase in track facilities and at a less additional investment than for equivalent tonnage operation with steam and, in addition, will—

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Lower C. T. Costs.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

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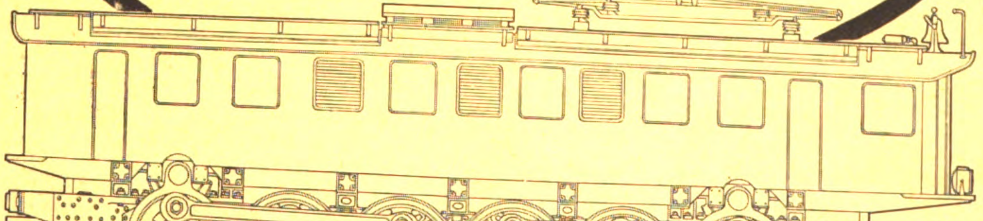

Type of Single-Phase Motive-Power Unit to be built for the Virginian Railway

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA

Westinghouse

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1923

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Reception

ENTER the reception room-library where we chat a while before starting through the House of McGraw-Hill. What a startling contrast between the harmonious restfulness of this room and the roar of the street twelve stories below! Busy workers, hidden by the cases, are using telephones, typewriting machines, dictaphones, yet no sound disturbs the peacefulness of this great room of lofty ceiling, cathedral-tall windows and perfect coloring. Bound volumes of ELECTRIC RAILWAY JOURNAL and our other publications line the shelves. The glass case dimly seen at the left holds the silver cups won by baseball, bowling and golf teams made up of McGraw-Hill employees—for McGraw-Hill always goes out to win.

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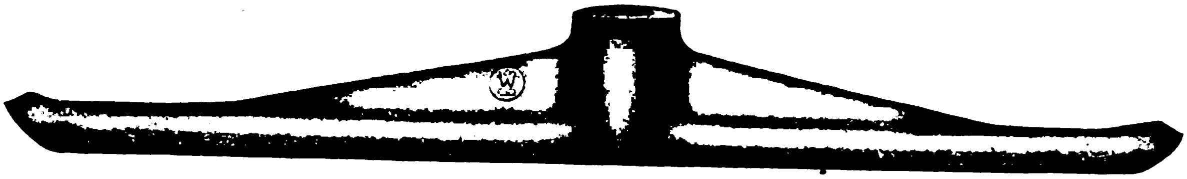
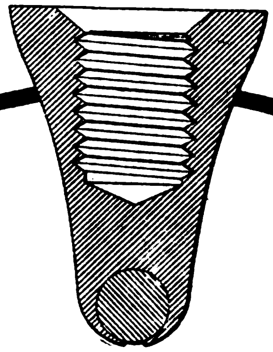
A Serviceable Ear

The Westinghouse Type EL Low-Center Ear For Round Wire





Full Scale Section of Type EL Ear
Height of Ear at Boss 1¾ inches

There is no danger of the trolley wheel striking the boss on the ear. The carefully worked out design prevents this. The distribution of the metal at the center is such, that when the ear is used on curved construction, and subjected to side pull, it takes an easy curved form.

The composition is the standard A.E.R.A. formula, and each heat is tested to assure uniform quality.

The EL Low-Center Ears for round wire are made in 12-inch and 15-inch lengths, for all sizes of wire.

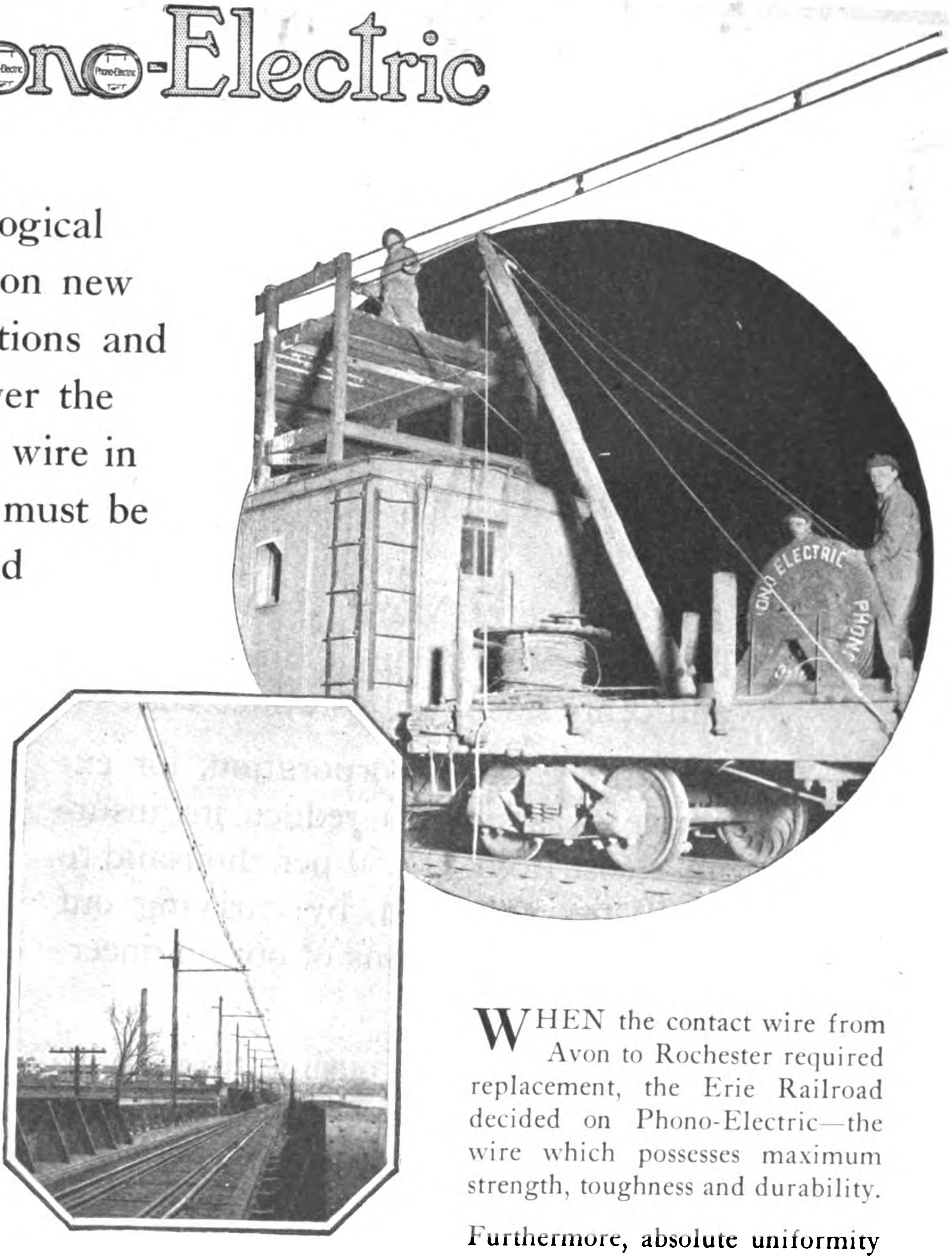
Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

WESTINGHOUSE ELECTRIC

Westinghouse

Phono-Electric

Is the logical
Choice on new
Installations and
Wherever the
Contact wire in
Service must be
Replaced



WHEN the contact wire from Avon to Rochester required replacement, the Erie Railroad decided on Phono-Electric—the wire which possesses maximum strength, toughness and durability.

Furthermore, absolute uniformity is assured by special manufacturing processes which test every inch of Phono-Electric wire to 95% of its ultimate tensile strength.

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AERA

“Bri◆ort”
TRADE MARK

Phono-Electric Endures

Bridgeport Brass Company
Bridgeport Connecticut

Insurance plus
Marsh & McLennan Service

A Worth While Saving

The Service of Marsh & McLennan Engineers results in a direct dollars and cents saving in insurance cost.

A large Eastern corporation, for example, was able to reduce its insurance cost from $17.50 per thousand to $4.30 per thousand, by carrying out the recommendations of our engineering service.

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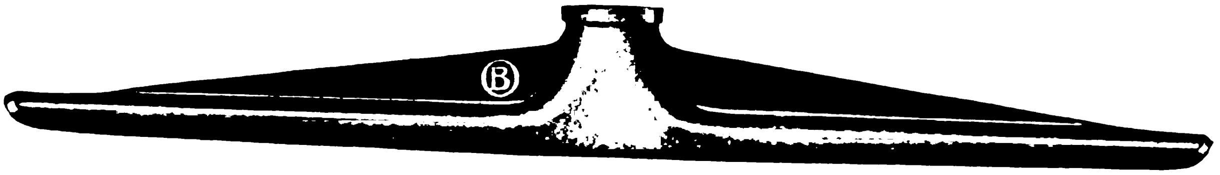


O-B Improved Type A Ear

Improved Type A Trolley Ears are more than just cast ears

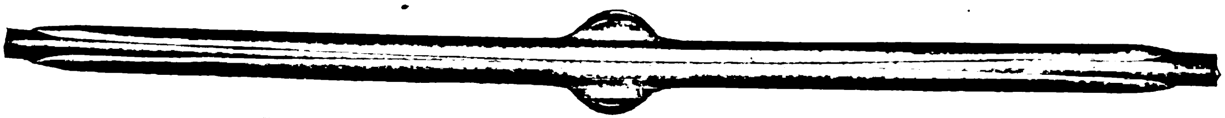
You might be apt to think that a cast-bronze trolley ear would be the same no matter in what foundry it is cast. But there can be a very pronounced distinction in cast ears, not only in material but also in design features. There is proven distinction in O-B Improved Type A Ears.

The cut below shows how the approach tips are shaped in the Type A ear and how the boss extends entirely down to the lips at the center. When clinched snugly around and against the trolley wire the lips offer a gradual approach for the wheel onto the underrun. There is body in the ear at the center to stand the wear. Service has proved that this shaping not only adds life to the ear but also to the trolley wire.

And then O-B Bronze is made to a distinct formula for Type A ears. An unusually well-equipped laboratory originated this formula from long and intimate contact with the circumstances under which trolley ears are used. This laboratory regulates the foundry. Metallurgical control is thorough and complete. It includes chemical analysis of content, photomicrographic examinations of structure and physical tests to determine the ultimate tensile strength, elastic limit, elongation, reduction of area, resiliency and hardness.

This painstaking supervision can not help but put distinctive performance into Type A ears.

O-B Improved Type A Ears are made from the best bronze modern science knows.



Bottom view of O-B Improved Type A Ear, showing tapered approach

The Ohio Brass Co.
Mansfield, Ohio, U.S.A.

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Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators

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Will Help These Three Departments

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Save money on your annual tie requirements. Our large quantities of Standard A.R.E.A. specification ties make immediate shipment possible. By using International Tie Service you save your entire heavy line inspection expense which, in some cases, amounts to more than 5 cents per tie. Besides you are relieved of the heavy expense of carrying the financial investment in ties during the long seasoning period. The financial advantages and operating economies resulting from International Tie Service warrant your investigation.

Mr. Purchasing Agent:

International Tie Service gives you complete control of your tie purchases and distribution. We carry in stock large quantities of standard ties — all grades to give you efficient "ship today" service. Such service insures the right kind of ties at the time when you need them — and at a considerable saving per tie.

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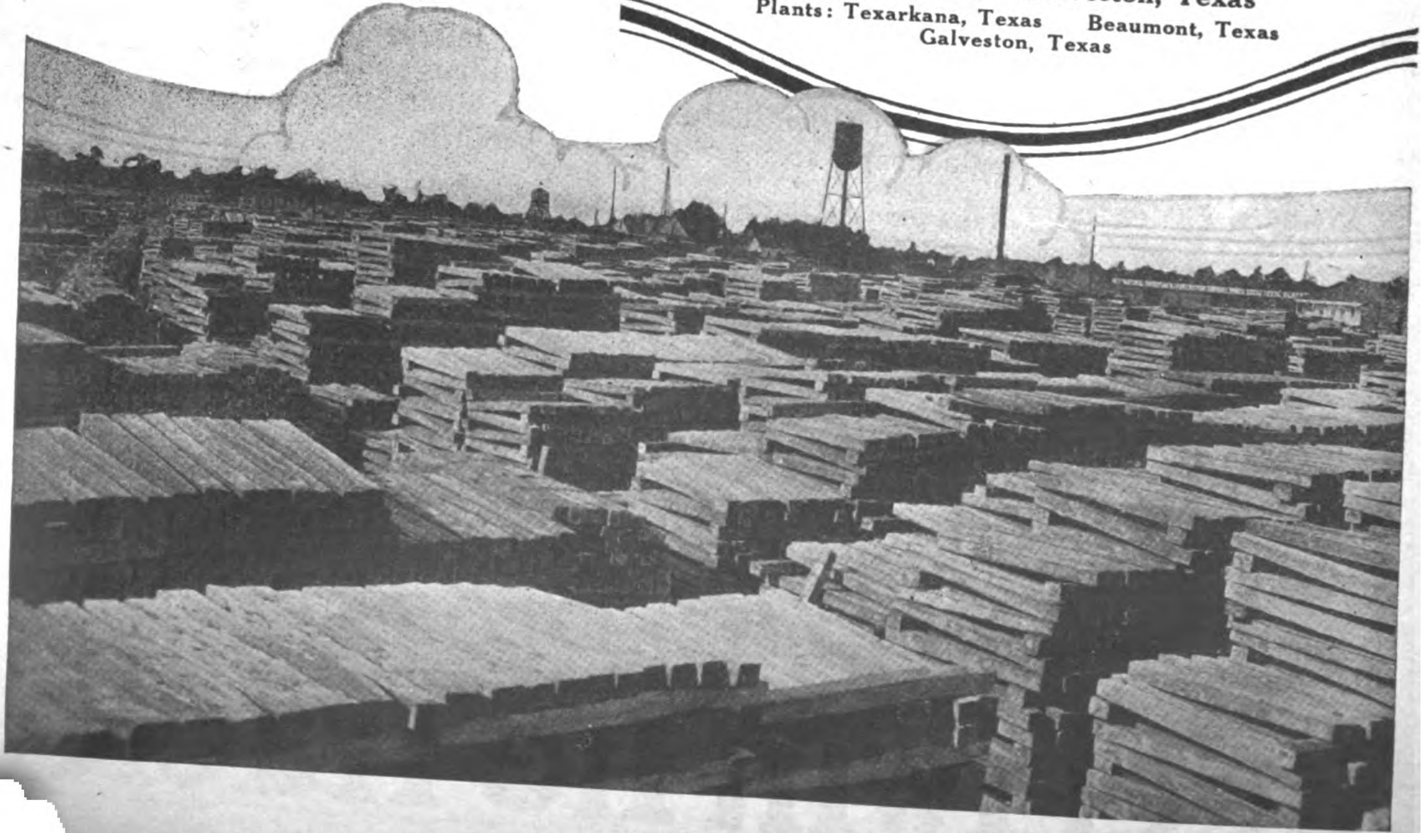
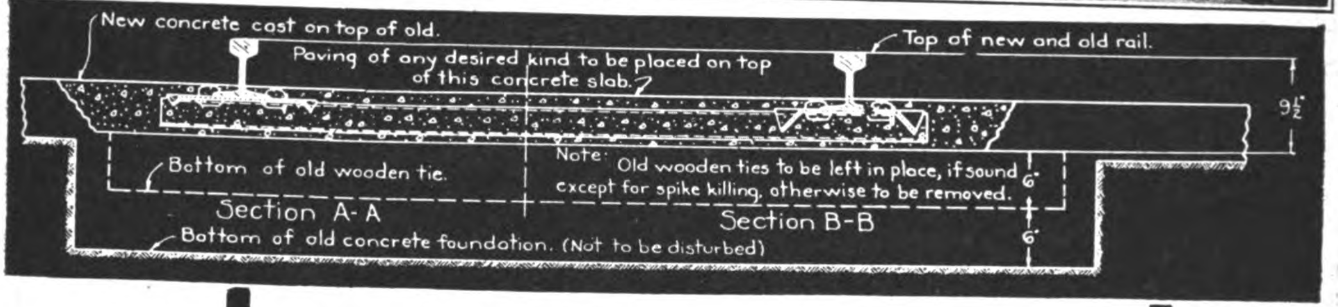
Check inspection is all that is necessary — you can thereby save your entire line inspection cost. Besides the larger ties for main line are loaded out together, as are the smaller and less expensive ones for branch lines and side tracks, making a very efficient and time and money saving method of distribution.

International Creosoting & Construction Co.

General Office—Galveston, Texas

Plants: Texarkana, Texas Beaumont, Texas
Galveston, Texas




New concrete cast on top of old.
Top of new and old rail.
Paving of any desired kind to be placed on top of this concrete slab.
9½"
Bottom of old wooden tie.
Note: Old wooden ties to be left in place, if sound except for spike killing, otherwise to be removed.
6"
Section A-A
Section B-B
6"
Bottom of old concrete foundation. (Not to be disturbed)

In 1921 and 1922 Twin Ties Saved 29,496 Lineal Feet of Old Concrete Track Base

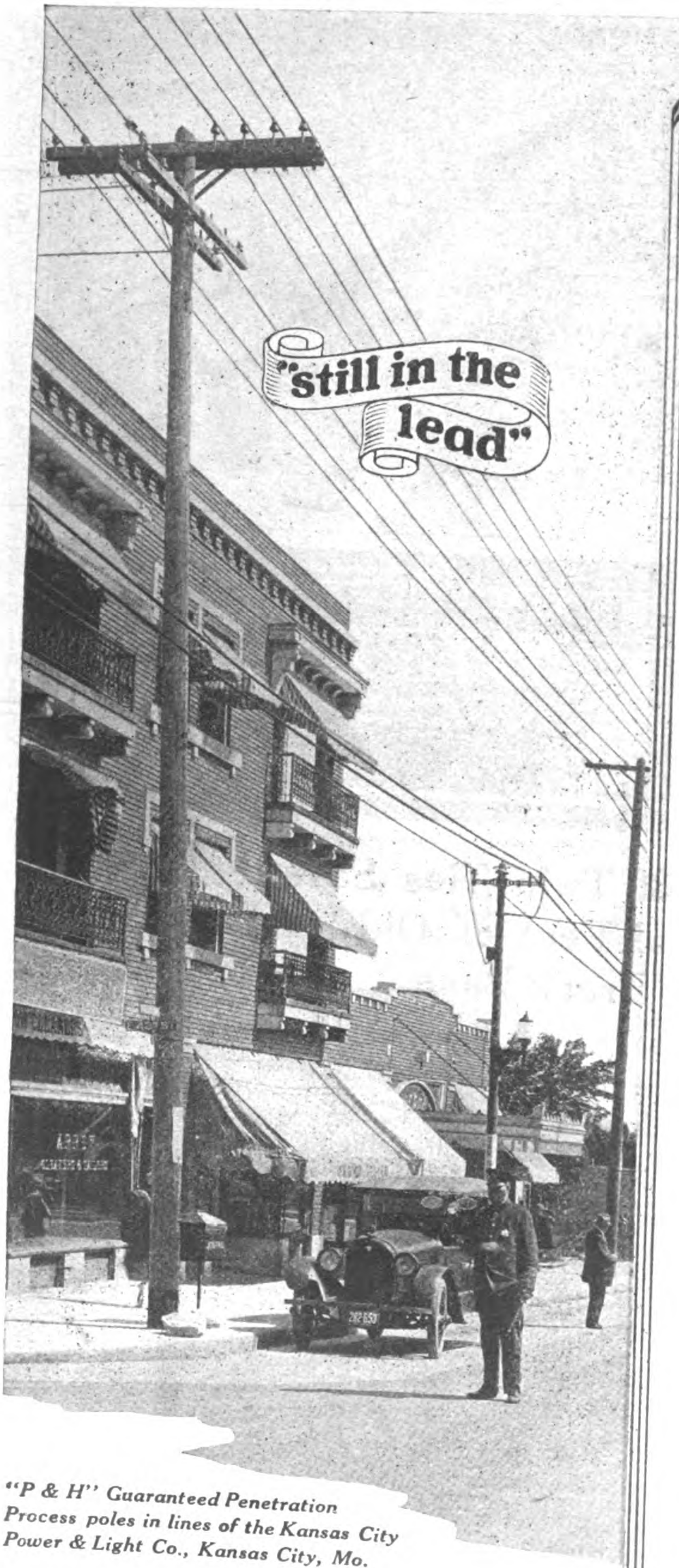
WHERE worn out track which has a concrete base under wood ties is to be rebuilt, Steel Twin Ties fit every case with a saving in first cost which has been as high as $26,928 per mile.

The conditions vary, of course, as to rail heights and clearances. For instance, in the case shown in the drawing, a clearance of 3½ inches was available; while in the job shown in the photograph the clearance was only 1¼ inches.

Before considering the removal of old concrete base let us prepare a suggestion and estimate for rehabilitation with Steel Twin Ties.

THE INTERNATIONAL STEEL TIE CO.
Cleveland, Ohio

Steel Twin Tie Track



"P & H" Guaranteed Penetration Process poles in lines of the Kansas City Power & Light Co., Kansas City, Mo.

Guaranteed

There's no "ifs, ands or buts" - no guesswork - about "P & H" Guaranteed Penetration Process Poles. You **know** what you're getting.

It's down in black and white in the written guarantee that goes with every shipment — "impregnated with the preservative to a uniform depth of one-half inch" throughout the ground-line area—and "the Butt-Treating price will be refunded on any pole that does not show the full specified half-inch penetration."

The "P & H" Guaranteed Penetration Process

—is the original guaranteed penetration process. It gives you the most for your money—the longest pole life. Insist on the **genuine "P & H."**

We can fill any pole needs—for Butt Treated and untreated Northern White and Western Red Cedar poles—or for any form of Butt-Treatment.

Prompt shipment assured by the convenient location of our yards in the North Central and Western States.

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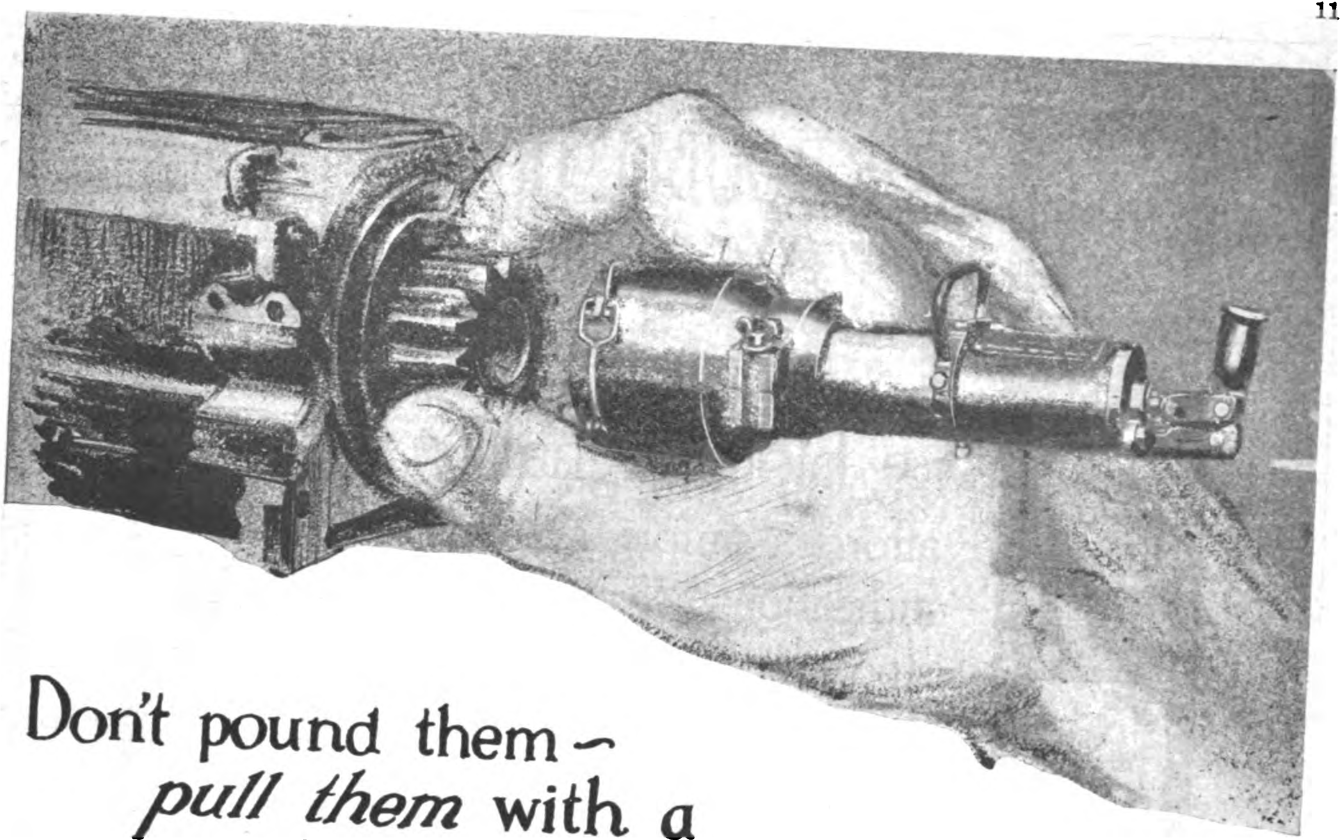

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Resistless yet harmless

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A one-man apparatus, functioning on the hydraulic power principle and using oil as the medium so that there is no danger of freezing. Weighs only 50 lbs.

It's easier, safer, quicker and cheaper to use the Peerless Portable Pinion Puller.

The price will interest you—write us

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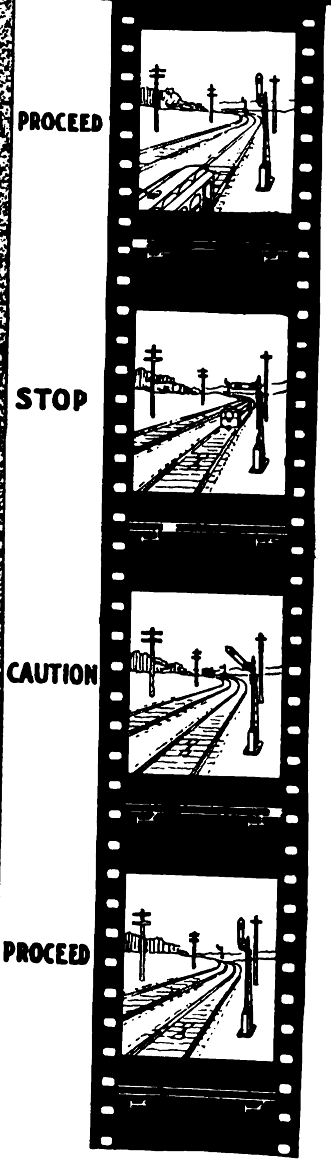

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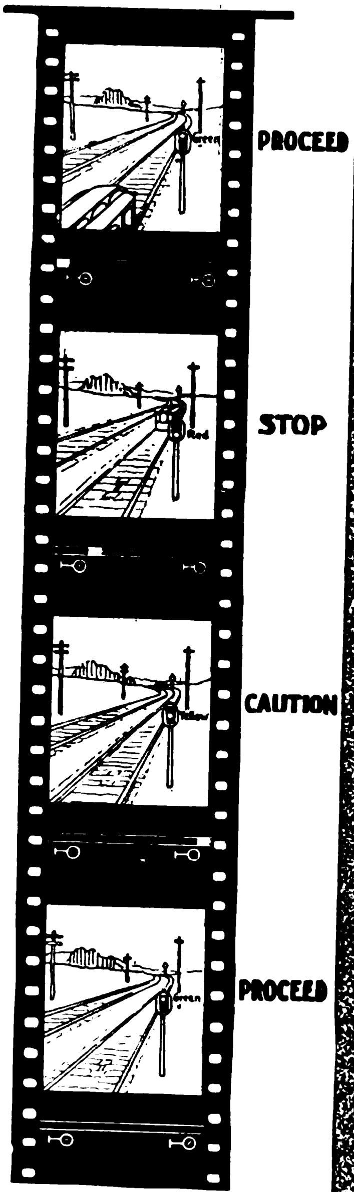

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Union automatic ■ block signals ■

afford a simple system of indications easily understood by trainmen.

The continuous A. C. track circuit makes possible the use of "polarized" or "wireless" control and insures the display of the proper indication at all times.

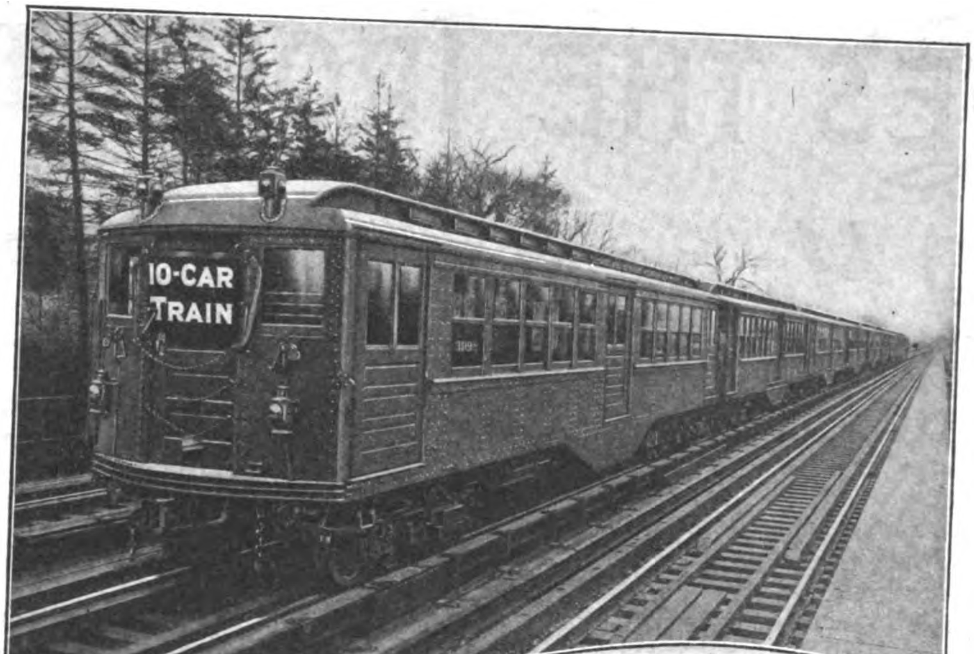
On the W. B. & A. Railroad

UNION EQUIPMENT WILL SOLVE YOUR INTERURBAN TRAFFIC PROBLEMS

Let us study your operating conditions and cooperate with you in considering what *automatic block signaling* will do for *your line.*

Union Switch & Signal Co.

SWISSVALE, PA.



21
SAFETY CAR
21

30 passengers or 3000!

Either in small lots or large ones, the handling of passengers is facilitated, and made safer with pneumatized door equipment.

Thousands of passengers board and leave a 10-car New York subway train during a single trip. Imagine *five* platform guards which make the crew, opening and closing those *twenty-eight doors* by hand at every stop!

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Whatever size or style of car you have

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increases interchange capacity and promotes safety. Let us figure on your installation.

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Originators and Manufacturers

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Manufactured in Canada by Dominion Wheel & Foundry Co., Ltd., Toronto, Ont.

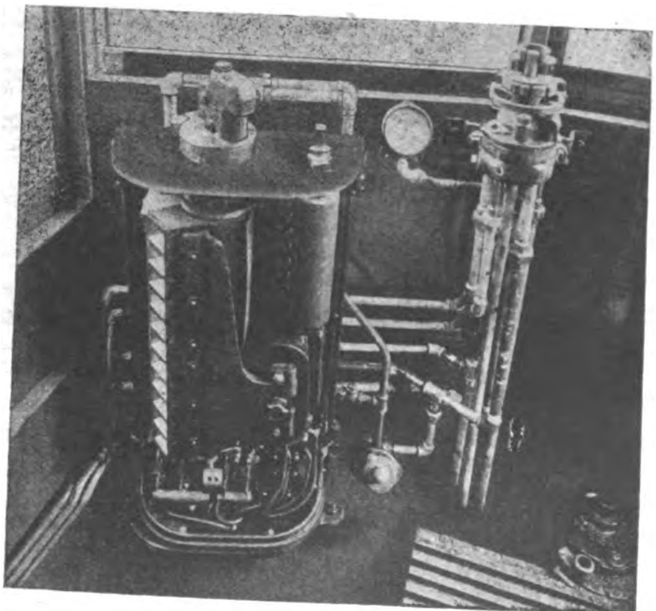
HERE'S THE TROUBLE, and HERE'S THE CURE

"All maintenance men are familiar with the difficulties experienced with new air actuated equipment on account of scale and dirt from the new piping collecting at undesirable points. Many of these difficulties can be avoided by a careful installation of the pipe. Before pipe is assembled it should be thoroughly hammered to loosen all scale or dirt, all fins and burrs tending to restrict the opening should be cut away and the pipe should then be blown out to remove all such matter. This treatment should be given before the pipe is in place, for otherwise it is apt to result in the deposit of this matter in some part of the pipe system or in the appliances connected thereto*"

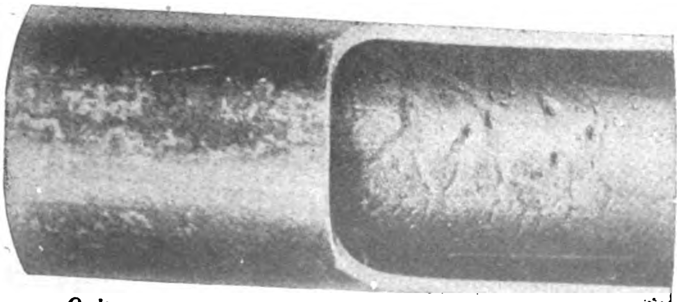
From an article in Electric Railway Journal, by Joseph C. McCune, Westinghouse Traction Brake Co., entitled, "Installing Safety Car Control and Air Brake Equipment."

"NATIONAL" Welding-SCALE FREE Pipe having clean, smooth surfaces both inside and out, is ideal for installations on electric railway cars, and can be depended upon to greatly reduce the troubles caused where welding-scale is present.

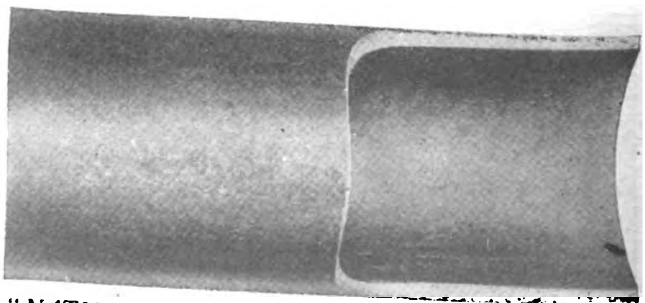
All "NATIONAL" Butt-weld Pipe, sizes ½ to 3-inch, inclusive, is made by the scale-removing process. The advantages resulting are described in "NATIONAL" Bulletin No. 7–Manufacture and Advantages of "NATIONAL" Welding-SCALE FREE Pipe. Everyone interested in the installation of piping for conducting air, in any type of service, should have a copy of this Bulletin. Ask for your copy today.



A typical installation of "NATIONAL" Welding-SCALE FREE Pipe on a modern street car.



Ordinary black butt-weld pipe showing characteristic coating of welding-scale



"NATIONAL" Welding-SCALE FREE Pipe, showing clean, smooth surfaces of this modern product.

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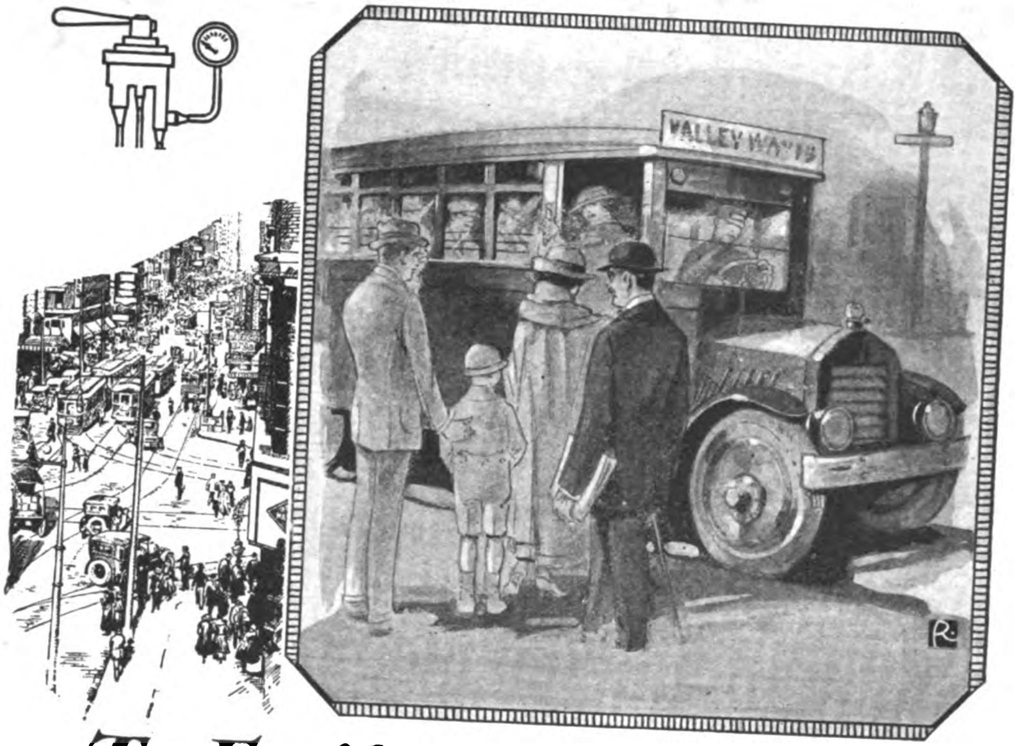

To Facilitate Bus Operation

MANY traction companies are now operating Motor Buses in auxiliary service.

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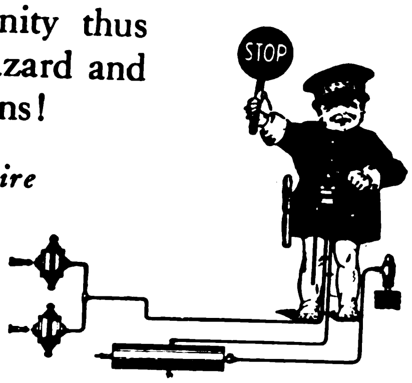
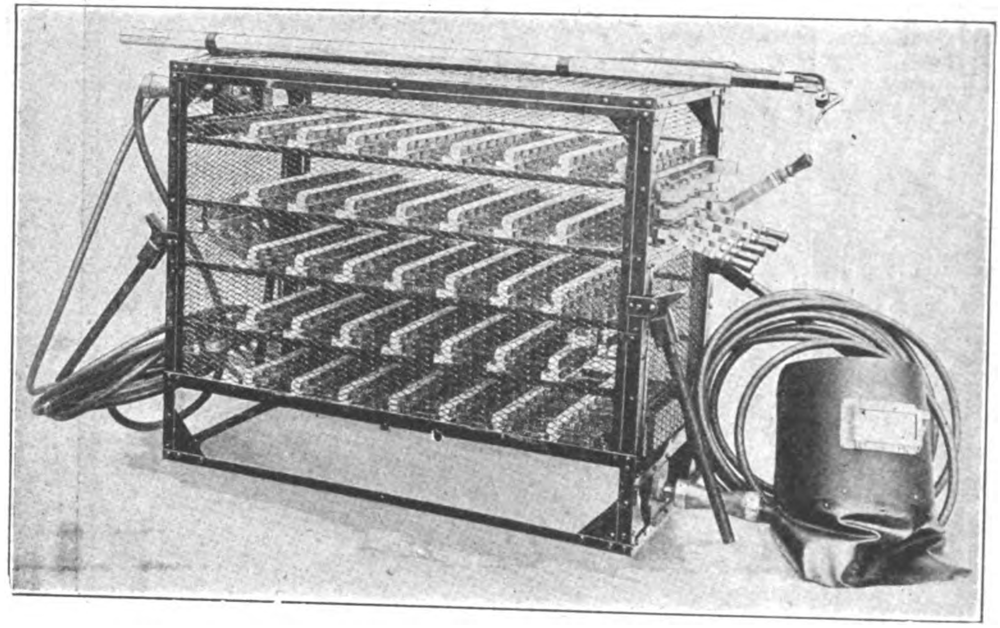
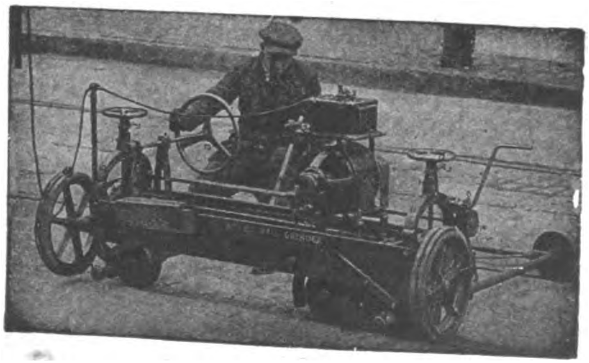


Receiving Rail at Joint Is Bound to Cup



Ajax Welder and Atlas Grinder
for
Low Joints and Battered Frogs



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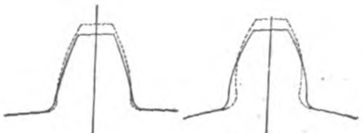

Dotted line shows tooth-form 14½° involute. Solid line shows tooth-form of Nuttall Helicals.

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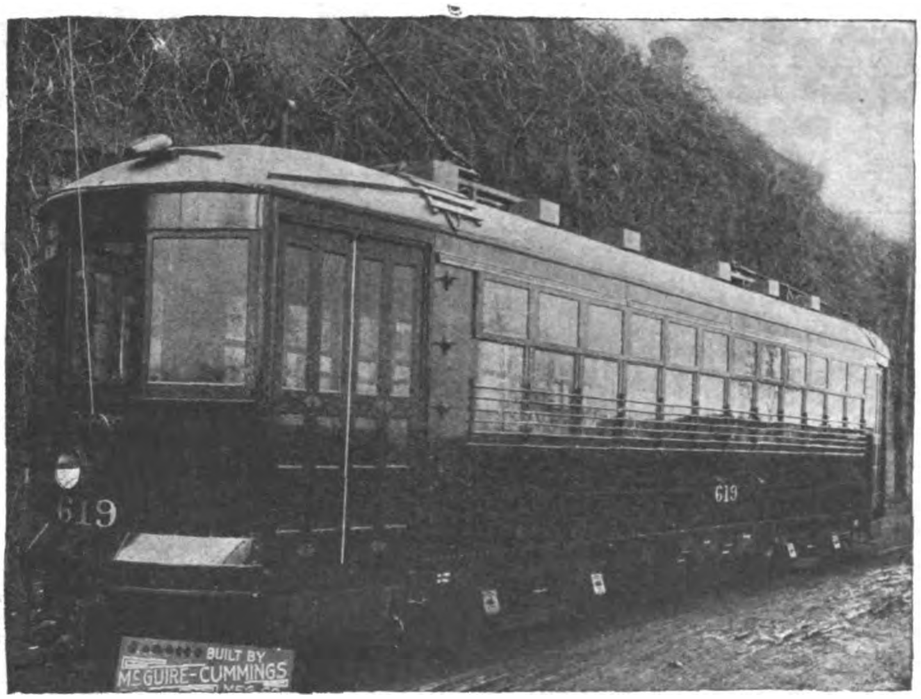

City and interurban cars and trucks, safety cars, combination and work cars, snow-plows, sweepers and electric locomotives.

Twenty years of specialization in the construction of all classes of rolling stock for the successful operation of electric railways.

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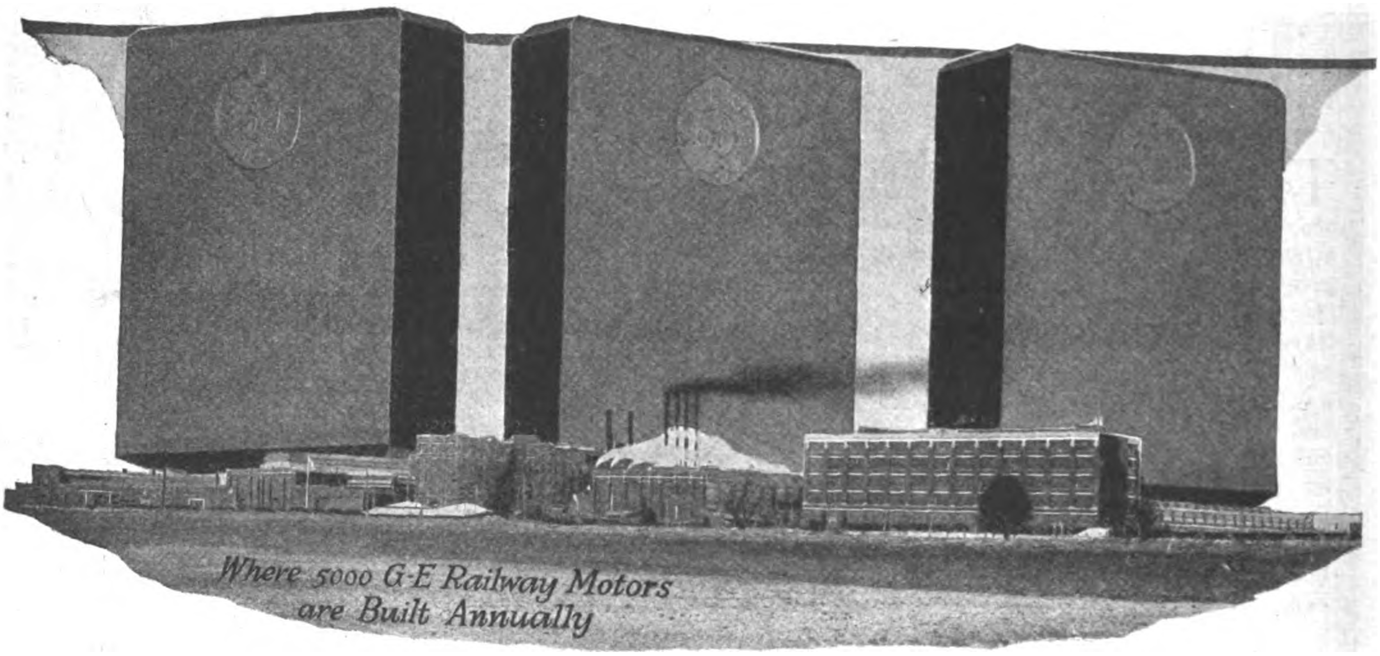

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New York, Saturday, July 7, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Company, Inc.
Henry W. Blake and Harry L. Brown, *Editors*

Volume 62
Number 1

Traffic Studies a Better Guide to Service Adjustment than Statistics Alone

THERE was a time when electric railway service was determined by the superintendent or other officer, unassisted by information of any sort. Little attention was paid to comparative statistics, such as given by the revenue per car-mile or per car-hour. If the receipts were sufficient to cover the expenses and leave plenty for return on the capital, little thought was given to such matters as analyzing the figures on any basis. That day has passed, and in its stead the auditor has come forward with periodical statements showing the revenue and expenses reduced to terms of all sorts of units, such as the car-mile, the car-hour, the mile of track, and such other things as officials of the road think are desirable. Periodically he prepares balance sheets and statements showing the income and expenditure classified with infinite detail.

It is not particularly difficult for an accountant to determine what it costs to operate the average car or to tell what the average receipts are on any desired basis. The difficulty is that the manager is likely to look over his balance sheet and spot at once the routes where the receipts do not equal the costs. Too often he comes immediately to the conclusion that the red figures represent an intolerable condition which must be eliminated at once. The result is likely to be a cut in service. On the other hand, a line which shows a good margin of receipts over expenditures is likely to be left alone, or even have its service increased.

So many things enter into the receipts and expenses that it is difficult to classify them with great accuracy on a car-mile, car-hour or other similar basis. Statistics of this sort must be used with caution, for while they give a great deal of information of much value in determining the correct service, a manager who does not go beyond what the figures show is likely to make his results worse.

A far better method of attacking the problem of giving necessary service is the traffic survey. The paper read last week at the convention of the Canadian Electric Railway Association by Alexander Jackson, superintendent of time-tables Public Service Railway, outlined a method which may be used to give real information on the necessities for each line. Analyses such as he proposes will make it possible to determine the correct service, regardless of earnings. It frequently happens that a line which is long, or which does a great transfer business, may show relatively small receipts per car-mile or per car-hour, while the service demand on it is very great. Another line that does a large cash business, or is relatively short, may show high receipts and correspondingly low expenses. The traffic survey eliminates all of the doubt and makes it possible to adjust the service to the real demands.

When it is figured that saving one car on the base schedule will cut expenses $15,000 to $20,000 a year, it is not difficult to see that even with a medium-sized property the traffic study will pay for itself handsomely. It is safe to say that practically every system operates some waste service, and that on some lines there are conditions of overcrowding. By taking a part of the saving which may be obtained from proper adjustment of the service to establish an effective traffic department, the service can be so planned that passengers will be better suited, and the revenues of the road are almost bound to increase. Attention to this will in practically every case give better and more lasting results than putting too much dependence on statistics which may or may not reveal the true state of affairs.

Is a Standard Subdivision of the Present Primary Accounts Desirable?

THE effort of the joint committee on engineering accounting of the Engineering and Accountants' Associations to prepare subdivisions for the primary accounts in the standard classification for class A roads is a step well worth while at the present time. When the original classification covering operating expenses was drafted some twenty-six years ago, and again when the classification was expanded in 1907 and 1914, several of the engineering and legal questions which are now recognized as of great importance in electric railroading had not arisen.

This does not mean that changes in the classification itself are necessary. It does mean, however, that some of the larger roads desire more information in regard to their accounts than is prescribed in the classification. For this reason it is obvious that they will divide their primary accounts into certain subdivisions, and it is well that a committee should report on those divisions which appear to it to be the most advantageous. The extent to which some companies are already following this practice is shown by the long list of sub-primary accounts in the way and structures operating expense accounts kept by a large company on the Pacific Coast and listed on page 1046 of the June 23 issue of this paper.

Of course, opinions may differ as to the basis on which these subdivisions should be made. In the way and structures operating expense or capital account, for instance, one basis might be the kind of material used in the track structure. Thus, the subdivisions for the tie account might be wood, steel or concrete, for the paving account, wood, brick, asphalt or other enumerated kinds of paving, and for the rail account, different shapes or degrees of hardness. While such figures would be of interest in giving comparative data for different materials or forms of construction, it is interesting to note that in the many subdivisions in the classification published June 23 this method has been followed only in connection with the paving, and there it is used to differentiate only between two kinds of paving, namely, asphalt and concrete in one group and oil macadam in the other group.

On what basis, then, should the accounts be divided? While the author of the article mentioned did not answer this question directly it is evident that the Pacific Coast classification does show a pretty consistent effort to keep the charges for material and for labor separate from each other and also to keep a separate record of the cost of the transportation of the material to the point of use, whether hauled by outside teams or in the company's own work trains. There is also the subdivision under all appropriate primary accounts of "municipal and legal requirements and property retired."

Probably one of the most important applications in the future of these sub-primary accounts will be in valuation work. Here it might often prove very convenient for a company to be able to separate the cost of labor, cost of material and transportation from the other charges, so a set of divisional accounts might bring to light items of original cost of considerable size which otherwise would be hidden. In still other cases it is easy to see that a record of expenses classified under "municipal and legal requirements and property retired" might also prove useful.

Obviously, each company will have to select the sub-primary accounts which its conditions require, but an active committee can be of great help in suggesting what sub-primary accounts are desirable.

Cultivate Tact in Enforcing the Regulations

EVERY electric railway has a set of rules governing the conduct of passengers on its cars. Spitting on the floor is prohibited as a matter of public health, smoking is forbidden or restricted to a certain section of the car, and disorderly conduct is not allowed. Just how far the railway should go in enforcing these regulations is somewhat of a problem. Experience shows that the mere posting of a notice warning passengers against these actions is not a sufficient precaution. Conductors sometimes make mild remonstrance against objectionable behavior, but how seldom it happens that a conductor takes really vigorous action to stop a nuisance.

Some curious notion seems to exist that when a railway insists upon adherence to rules of decent behavior on the part of its passengers it is meddling in an unwarranted way in their affairs and abridging their constitutional rights and privileges. There is, however, no sound basis for such an idea. The cars are the domain of the railway and the conductor is the representative of the company. As such he should see to it that the rules of the company are lived up to. For every one person who may feel injured by being compelled to obey the rules there are a dozen or a score of passengers who will feel irritated and annoyed if some one else is allowed, under the guise of liberty, to create a nuisance in the car. The enforcement of rules should therefore be strict, not only because they are fundamentally right but also because it will pay to have them observed.

In this process the conductor occupies a difficult position. It is not the desire of the company to make its regulations onerous, yet, for the sake of the protection and respect of the patrons in general, the conductor often has to take matters in hand. Here is where a tactful approach, a friendly appeal to the offender's better sense, quietly made, is usually far more effective than an abrupt command or a bullying warning. Some special attention to this matter might well be given by managements, just as another step in cultivating those qualities in the trainmen which help to build the good will of the public.

Reduction of Accidents Is Worth Paying Well for, If at All

ON MANY roads payments for accidents and damages form a not inconsiderable part of the outgo, frequently reaching 5 per cent of the gross revenue and sometimes as much as 10 per cent. In the final analysis, very few accidents are unavoidable, although not all are caused by the carelessness of the company's employees. The West Penn Railways has set as a goal the elimination of all accidents that can be charged against the trainmen, as described in an article that is presented this week.

The outstanding feature of the accident prevention campaign on the West Penn is that the company has been willing to share generously the benefits of accident reduction with the men. It may be argued that the duty of a trainman is to operate without accidents, so that there should be no special merit or consideration attached to their elimination. Acting on this, certain roads have made the attempt to get safe operation merely through appeals to the men's consciences. The appeal to conscience, however, is not nearly so great in the average individual as that to the pocketbook. The opposite argument to the foregoing is that the careful trainman ordinarily gets no more pay than the careless one, so why should he do more than keep out of such situations as will jeopardize his job?

The idea of having the men divided into groups is not new, although usually on other properties one carhouse or division has been pitted against another, while here each division is divided against itself. By this means the contest is localized so that the men know those against whom they are competing, and the spirit of rivalry is intensified.

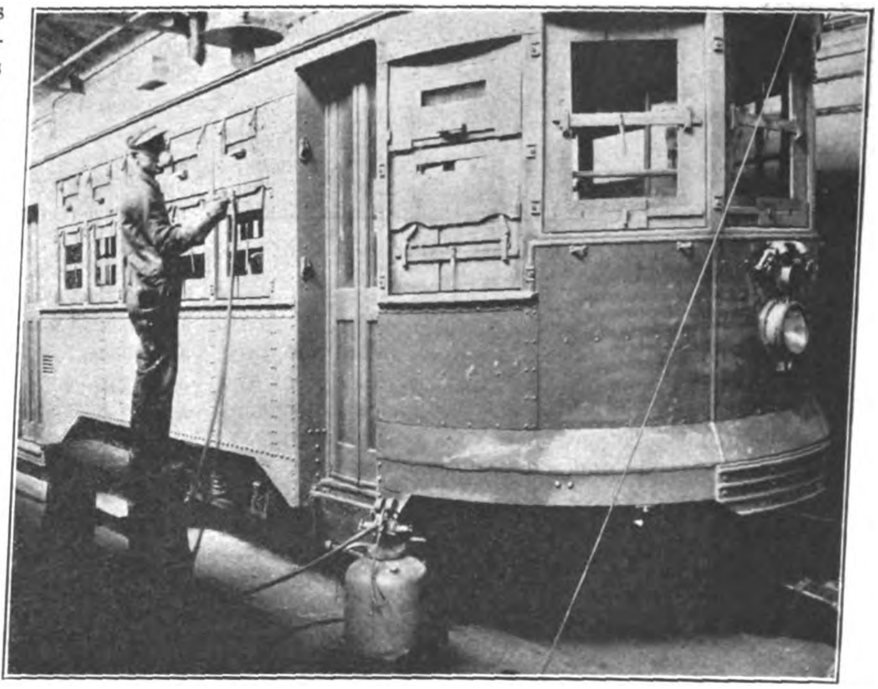
The second part of the West Penn plan, in which each man is paid a reward in proportion to the length of time he has immunity from accidents, gives a chance for the individual to compete not only against his fellows but against himself. The rewards are substantial, and the quarterly settlement plan allows enough money to accumulate so that the payment will purchase things really worth while. There also is the feeling that if a man loses his standing by having an accident he must begin at the bottom again, and it will be ten months before he is getting the maximum payment. This should prove to be a decided stimulus to the men to keep their records clear.

The claim may be made that the payments will be burdensome in case all the men are getting the maximum bonus. This is quite true, but it is equally true that the payments for damages will be eliminated entirely in that event. It is estimated that the maximum rate of payments will be about one-third the present accident expense. If a bonus for safe operation is given at all, it ought to be a worth-while bonus. It is believed that some companies have almost aroused the contempt of the men rather than their enthusiastic co-operation by making the bonus a mere pittance.

Time of Painting a Car Cut in Half

Methods Used at Cold Springs Shops, Milwaukee, Prove Effective and Economical—Guards and Accessories Are Used as a Result of Labor Time Study

By J. A. Lucas
Superintendent of Rolling Stock,
Milwaukee Electric Railway & Light Company



In Spray Painting the Exterior with Sash Removed, the Windows Have Special Guards to Keep Paint from the Interior

CONSIDERABLE interest has been shown of late in the pneumatic spray painting system as installed in the various electric railway shops throughout the country for the painting of interurban and city passenger car equipment. The change from the brush, or hand method, to the spray method was made about two and one-half years ago at the Cold Springs shops of the Milwaukee Electric Railway & Light Company, first as an experiment, and later it was adopted as the standard shop practice. Previous to this change, the method of spray painting was used somewhat at the shops on car trucks, structure and utility equipment, the small outfit for rough work not being adaptable for the heavier paint and varnishes used in repainting of cars. Information had been received by the company concerning work that was being done in other lines with the paint spraying outfit, also that car builders were using spray painting on the new cars. Claims of the manufacturers of the spraying equipment as to labor and time saved were so attractive that the company decided in the fall of 1920 to arrange for a test of this type of equipment, to determine whether it could be applied to advantage to the work at the shops. The results obtained warranted the purchase of additional equipment, and plans were extended to embody certain other work, notably the spray painting of cars.

Painting may be said to be the direct application of a liquid substance to the surface of material for the purpose of preserving and beautifying the same. The importance of painting has been more generally recognized in recent years and may be summed up in a few words adopted by the paint men—"save the surface and you save all." Of the 857 revenue passenger cars owned and operated by the company, under the present system, about 350 cars are being put through the shops per year. At this rate, repainting and revarnishing the car equipment will take about three years. By repainting and revarnishing as frequently as this it is believed that money is saved by doing less work each time the car is in the shop than would be the case if the period was much longer. The cars also appear cleaner and more attractive to the patrons. In addition to the above work, the large number of utility and express cars are painted by the same method. They are put through the shops on a regular though independent schedule.

The cost of painting work consists essentially of (1) paint materials and paint supplies, and (2) labor expended in mixing and applying the paint. The approximate relationship between the first and second items before spray painting was used is indicated below, this being the result of actual analysis of cost returns on car painting work prior to the introduction of spray painting.

1. Paint, materials and supplies	25 per cent
2. Paint-labor	75 per cent

It is therefore seen that about three-fourths of the car painting cost was for the labor component. At that time, the great bulk of the painting work at the Cold Springs shops was done by brush, but early in 1921, following the spray painting test mentioned, the spray method was adopted for painting the car body exterior, and has been followed with results that have been gradually becoming better as the workers became more thoroughly familiar with the method and apparatus. The application of this system has been extended until, at the present time, the entire body exterior (including the lower and upper body and roof) is being spray painted; on the interior, the floors, headlining, seats, and panels are spray painted or varnished, using special guards to protect the woodwork, sash and molding not to be coated. Likewise, the method is made effective on some other miscellaneous items of work.

Spray Painting Seat Frames. Backs Are Protected by Covering

When the company first began its experiments with the pneumatic spray painting, the small amount of work done in the shops during the winter months when the doors were closed did not create any particular amount of objectionable mist or fumes. As the work was extended in the spring and summer the fumes were readily dispersed by the ventilation resulting from having the doors open at both ends of the paint shop. The following fall when it was necessary to close the doors, a restricted area of the paint shop was inclosed, as a paint spraying compartment, and equipped with the requisite fans and ventilating equipment. This allotted space is of such size as to accommodate six cars at one time and also room for spraying of seat cushions and other miscellaneous work which becomes necessary. The saving in our painting labor has been ample to pay for this inclosure and, in addition, the spray painting apparatus itself.

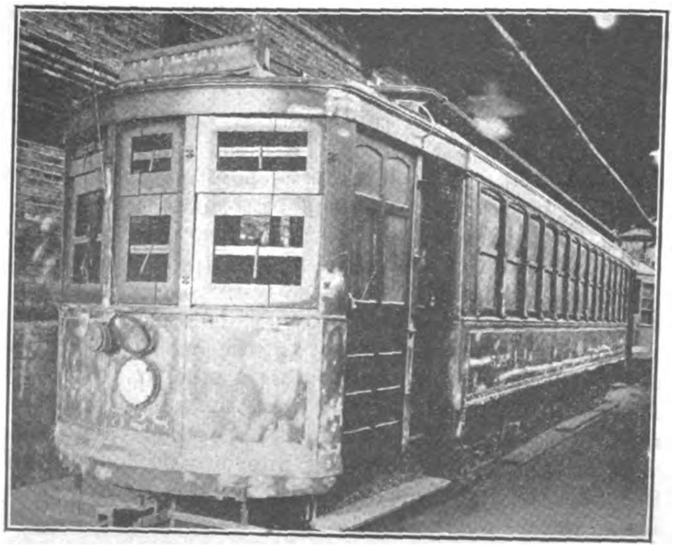
All operators of the paint spray are protected from the fumes by respirators, worn individually. There are three or four masks available for each man so that while he uses one, others can be cleaned or soaked in antiseptic solution. All painters are examined every month by the company doctor and there has been no indication of any detrimental effects on the workers resulting from the use of this method. Cleanliness is as requisite to good health with the brush method of painting as it is in the spray painting method. While some opposition was met when the system was installed on account of the old painter hands objecting to the use of apparatus, determination and insistence that the spray method was to be used finally produced results. The number of hours during which the spray method was used during a month was submitted to the superintendent of shops and equipment, and if a noticeable falling off was recorded, effort was made to correct that condition for the ensuing month. Within the last six months this record has shown a noticeable increase each month, serving to indicate that the men have accepted this method of painting.

COMPARATIVE MAN-HOURS FOR ACTUAL TIME FOR PAINTING A "500"-TYPE CAR

SCHEDULE OF PAINTING

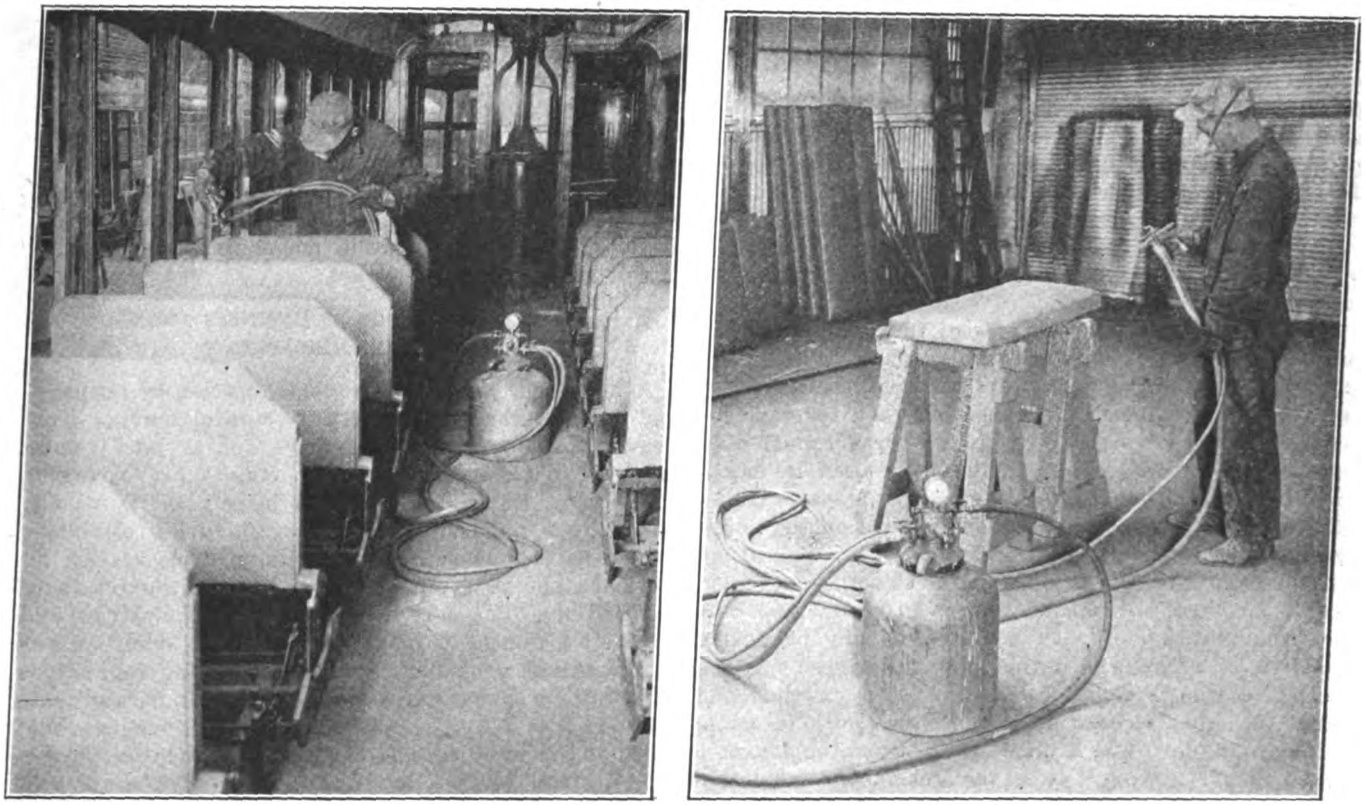
Brush Method Description of the Operation	Actual Time	*Spray Method* Description of the Operation	Actual Time
		Clean and paint trolley bases before spraying roof	0.8
		Prepare car for spraying complete	1.8
Paint first coat lead	6.8	Spray paint outside complete first lead	0.8
Paint second coat color	7.8	Spray paint outside complete second color	0.8
Paint third coat color	10.0	Spray paint outside complete third color	0.8
Paint floor	8.0	Paint floor (brush method)	8.0
Paint roof	6.0	Spray roof, upper and lower deck light frames	2.0
Varnish (outside) first coat	6.0	Spray varnish entire body first coat	1.0
Varnish (outside) second coat	6.0	Spray varnish entire body second coat	1.0
Letter and stripe	5.0	Letter and stripe	2.5
Sand, stain and touch-up	10.0	Sand, stain and touch-up*	10.0
Varnish inside compt	7.5	Varnish inside—spray	1.5
Spray trucks	0.5		
Paint headlining first coat	7.0	Spray headlining first coat	2.0
Paint headlining second coat	7.0	Spray headlining second coat	2.0
Paint seat backs	4.5	Spray seat backs	1.0
Paint seat cushions	2.0	Spray seat cushion	1.0
		Paint outside of doors, first	1.2
		Paint outside of doors, second	1.2
		Paint outside of doors, third	1.2
		Varnish outside of door, first	1.0
		Varnish outside of door, second	1.0
		Touch-up after spraying last coat of paint (*brush work)	1.8
		Touch-up varnish	2.0
Totals	94.1		46.4

* Remain the same as under the brush method.



Scheme Used to Fit Front Windows with Special Guards and Side Windows with Canvas

The photographs shown herewith illustrate to some extent the spray painting of cars as undertaken at the Cold Springs shops. Unique guards have been devised to protect the surfaces not to be coated. In spraying the exterior of cars, the car is first sanded and puttied, all sash removed, and replaced with sheet iron or cardboard sheets to protect the interior of the car. In some cases, where sash is not removed, the glass is covered with a special paste (calcium chloride and flour), which prevents the paint from becoming attached to the glass and can therefore be readily scraped and washed off. On certain types of cars an ingenious guard made up of wood strips has been devised which fits into the slot originally occupied by the window sash. These guards are readily removed and applied, a set of them comprising enough to cover one-quarter of the windows and openings in the car. Cheap labor may be used for the application of these guards, it requiring about one hour to put them up and take them down for a complete car. With one-half to one hour (average, eight-tenths of an hour) required for the actual spraying, the total time required would there-

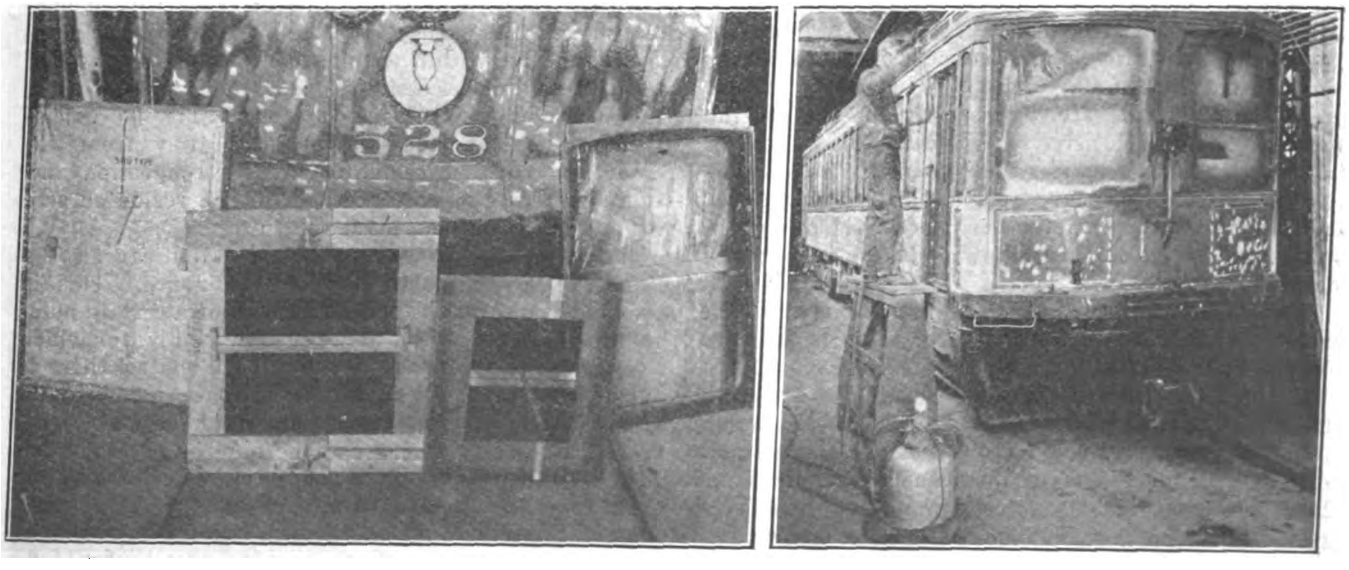


At Left—Varnishing Rattan Seat Backs Inside Car by Spray System. At Right—Method of Varnishing Seat Cushions

fore be two hours maximum for one coat of paint. To enamel the headlining a special guard to cover the molding and deck sash was constructed. For spraying seat backs and inside of the car with the tan-colored enamel, sheet-iron guards were made for the varnish woodwork of car sides. To spray the seat frames, which operation is accomplished outside of the car, it was found necessary to inclose the seat back in a sheet-iron covering of special design. The secret of the use of this method lies in the proper protection of the parts which are not to be covered with the particular coat being applied. Little concern is felt for the fact that a drop of paint of one particular color falls upon a portion of the car or seat which is later to be covered with a different color. In overcoming this difficulty as well as cases where oil or grease may be encountered, the spray method covers in a very satisfactory manner.

The advisability of installing the necessary paint spraying equipment developed into a problem of determining whether the money saved in painting labor balances favorably the fixed charges and operating costs of the necessary spray equipment and facilities combined with the increased amount of material used.

From accurate stop-watch time study observations made in connection with the premium system of wage payment used in the shop, it is estimated that 21,000 hours saving is effected yearly by the use of "spray" method of painting cars. At 60 cents per hour, which is low for this type of labor, the labor saving in dollars



At the Left, Special Guards Used in Window Openings. At the Right, in Painting Outside of Car the Windows Are Protected by Special Paste and cents should fall between $12,000 and $13,000 per year. The additional capital investment necessary to provide equipment and inclosure to permit of the spray painting of cars approximates $3,000. Deducting fixed charges, etc., it leaves an estimated net annual saving of about $9,000 to $10,000, which sum more than justifies the change to the spray method. The reduction in time necessary to have the cars in the paint shop relieves somewhat the crowded conditions the department was burdened with and is an argument in favor of this particular method.

One of the important features of this method is the correct regulation of the air, which must be continually in good condition. Moisture will spoil the evenness of the color coatings and is especially bad for varnish coats. Cooling coils and traps for drawing off the water have proved so satisfactory that even in damp weather little trouble is encountered. Proper regulation of the spray nozzle and air pressure on the paint reservoir is easily learned, and the proper application of the paint will give a job which is smoother and finer in finish than can be had by the brush method. In the inauguration of such a system in any particular shop it is recommended that one experienced man be obtained who is familiar with the spray method and that the other men required for spray work be ambitious young men who are anxious to learn the advanced method of painting. It is thought in this way that greater satisfaction will be obtained than where old painters are forced to use this method. There will always be a certain amount of hand-brush painting required to keep those regular employees who cannot change to the new method. In expanding the painting program the air spray will take the place of a number of new men and will materially assist in doing more work with the same number of men.

City Zoning Limits Congestion

Restrictions on Building Construction and Use Promote General Community Welfare and Tend Toward Decentralization—Careful Zoning Improves Local Transportation—Recommended for Providence, R. I.

ZONING, according to a recent report by Robert Whitten to the joint standing committee on ordinances of the city of Providence, R. I., consists in action by a community, through the enactment of an ordinance, to regulate the use of all real property in the city for the promotion of health, safety, prosperity and the general welfare. A comprehensive zoning plan divides the city into districts and prescribes the appropriate uses, building heights and yard and intensity requirements for each district. It prohibits business and industry in residence districts and prohibits industry in business districts.

With the entire city divided into districts in which the future development is fixed, a surer basis is provided for the determination of traffic streets, roadway widths, types of street paving, etc. The cleaning of streets is facilitated and the hazard of fire is reduced. By assuring the permanency and integrity of the character of districts, zoning conserves the value of buildings and land, preserves taxable values, promotes convenience, comfort, contentment and a more attractive environment in residence districts and maintains and protects the home and civic welfare.

Congestion is one of the most vital and difficult problems confronting cities at the present time—street congestion, transit congestion, land overcrowding and the congestion of population. Zoning can make a very great contribution to the reduction or prevention of these congestion evils. In the first place, zoning and regional planning can do much to lessen the increasing concentration of business and industry in the central part of the city. This concentration means increased traffic, transit and housing congestion.

DECENTRALIZATION OF BUSINESS AND INDUSTRY DESIRABLE

A movement toward the decentralization of business and industry can be furthered by careful zoning. The heavier industries naturally move out as land values near the center increase and opportunity for expansion is blocked. But the place of the large plant is usually taken by a number of light manufacturing establishments having several times as many employees as the former plant, thus adding greatly to transit and housing congestion. The spreading out of the industries and the establishment of industrial centers in suburban sections can be promoted by zoning. Zoning regulations can also promote the development of important subcenters that will take care of much of the business that would otherwise increase congestion in the central area. Zoning can further decentralization:

1. By providing in the zoning plan for large business districts around a number of the most important traffic and focal points throughout the city.
2. By providing for local or suburban industrial centers and for the extension of the industrial areas far out into the suburbs along most of the railroad lines.
3. By limiting the expansion of the central business and industrial areas, and thus tending to crowd out business and industries that can be more economically and appropriately located away from the main business, traffic and high value center.
4. By limiting the height of buildings in the central business and industrial area. This limits expansion vertically and has to a slight degree at least the same effect as the limitation of expansion horizontally, above referred to.

The decentralization of business and industry, as above outlined, is also essential in order to prevent the congestion of population in the residence sections adjacent to the central area. Employees working long hours at low wages can afford neither the time nor the money to live far from their work. In New York City it has been shown that a very large proportion of such employees will live within walking distance of their work, even though this necessitates their living in the most congested and unwholesome quarters. The movement of industries and places of business away from the center will make it easier to prevent congestion and secure better housing conditions in the residence sections adjacent to the central area.

The problem of congestion of population can also be directly attacked under a zoning ordinance. This is accomplished through the requirement of a certain number of square feet of lot area for each family, for which a tenement is arranged. Without such control there is a continual tendency in tenement construction to increase the number of stories and families and to decrease the size of rooms and the number of rooms per family. Congestion breeds congestion. Under a zoning plan, congested conditions already existing in any section of the city cannot be helped, but the extension of such conditions to other areas can and should be prevented.

Safety Pays Men Real Money

West Penn Railways, in Drive for Reduction of Accidents, Inaugurates Team Rivalry Among Trainmen, with Prizes Quarterly—Cash Awards Are Also Paid Individuals on Scale Increasing with Length of Clear Record—Bonus May Amount to $150 a Year

A SYSTEMATIC drive is being made for the reduction of accidents on the West Penn Railways. While this road has had an excellent accident record in the past, the management has felt that it could be bettered and, beginning with the first of the current year, has inaugurated an intensive campaign for the elimination of every possible accident.

Two plans have been worked out for the reduction of accidents, under the leadership of Daniel Durie, general superintendent of Territory "A," with headquarters at Connellsville, and Joseph Black, general superintendent of Territory "B," with headquarters at New Kensington. One is a contest between teams and the other is an individual campaign with a cash reward, with increasing payments depending on the length of immunity from accident.

The West Penn Railways operates some 200 miles of interurban railway lines in the Connellsville coke region and in the Allegheny Valley. The lines are largely on private right-of-way and the cars run at fairly high speeds, although the grades are heavy on some of the divisions and the curves are sharp.

CONTEST BETWEEN TEAMS INDUCES RIVALRY

The first plan, which has been in effect since the first of the year, is a contest among the trainmen, who are all enrolled in the competition. The trainmen in each operating division of the road have been placed in groups of from twelve to eighteen men, so as to have the number in each group as near alike as possible. In order to prevent any charge of favoritism in making up the teams they have been picked arbitrarily. In the Connellsville division, for instance, three teams were made up from the fifty-three trainmen by first allotting the motormen in alphabetical order to the three groups. The conductors were then placed on the same teams with their motormen, while the extra men and the one-man car operators were apportioned among the three teams.

Only such accidents were considered in the contest as it was felt the trainmen could prevent. It was not thought advisable to include other incidents that must be reported on the accident record, such as ejections, disturbances on the car and others of similar character. Had they been included it was felt that possibly a conductor might not do his duty to the extent of ejecting a passenger for non-payment of fare. The classification of the accidents that are included as the basis of the contest are as follows:

(a) Collisions with vehicles.
(b) Collisions with persons.
(c) Collisions with animals.
(d) Collisions with electric and motor vehicles.
(e) Collisions with cars.
(f) Cars left track.
(i) Boarding and alighting from moving cars.
(k) Boarding and alighting from stationary cars.
(l) Fell in, on or off car.
(m) Fell off car on curve.

When an accident happens that falls in any one of these classifications it is counted as one point against the crew in charge of the car on which it occurs. The conductor and motorman each takes half the responsibility. When two men from different teams are in charge of a car involved in an accident one-half is charged against each man. In the case of work cars or one-man cars the full accident is charged against the man operating the car.

When an accident report has been turned in and has been classified it is recorded on a large form which is posted in the carhouse. The record of the Connellsville division for the first quarter of 1923 is reproduced as typical. Each accident is denoted on this record by the letter corresponding to the classification under which it falls, as explained previously, being entered in the block for the date of its occurrence. In case men on different teams are involved in one accident, it is shown as two half accidents by the diagonal lines dividing the squares.

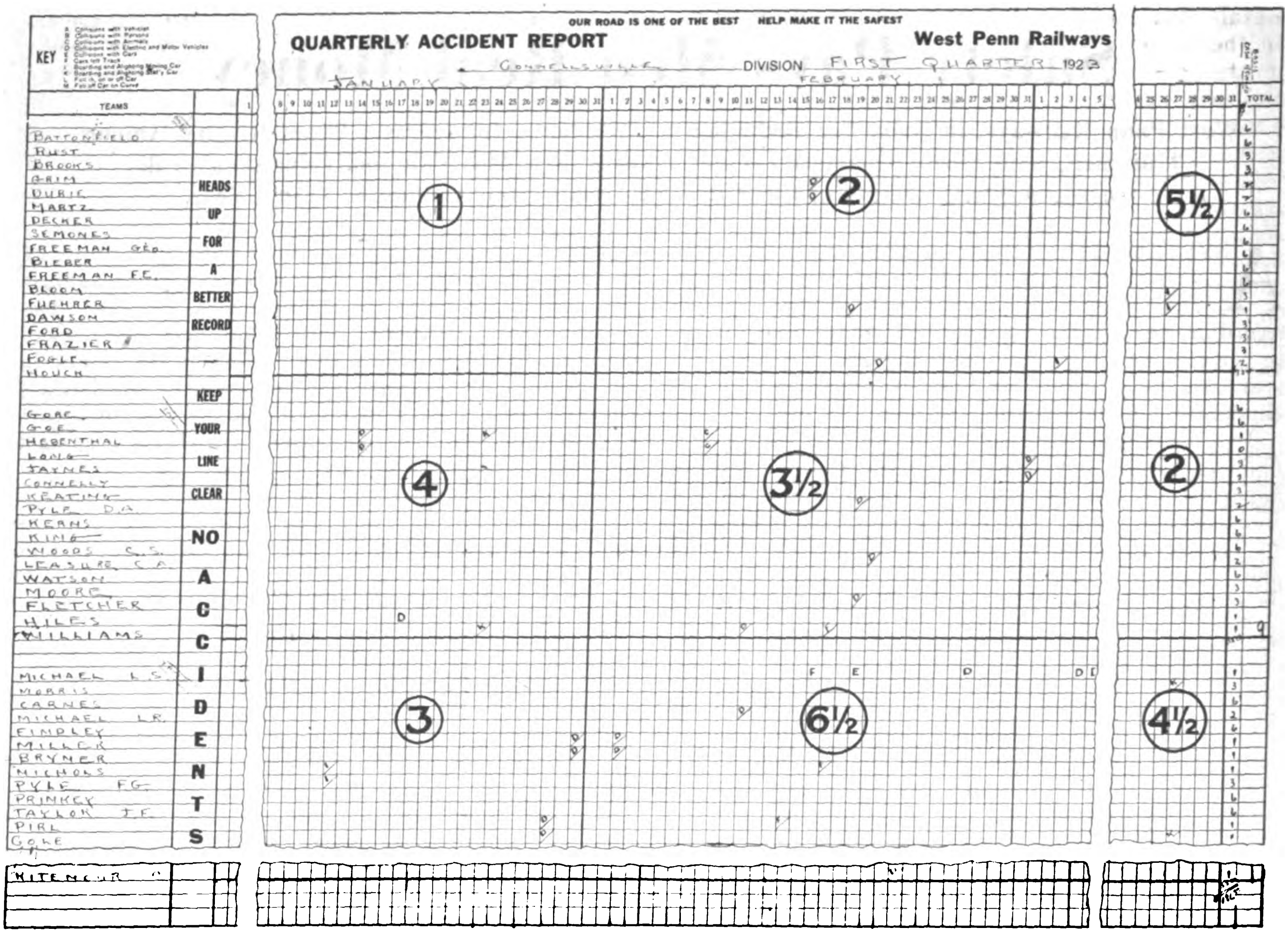
At the end of three months the accident record is cast up. The team having the smallest number of accidents charged against it is given its reward in the form of a banquet, at which the men are the guests of the company.

As a result of the posted record, the men are able to compare their standings day by day, so that an intense rivalry has developed among the teams in each division. This is indicated by the fluctuations in the standing of the teams from day to day through the quarter. The first one, for instance, had a perfect record for January and but two accidents during February, while for March it had the high record, with five and one-half accidents. The other teams, while behind in the first month, had relatively better showings in February and March. In several cases men have been transferred from one run to another, and extra men assigned to one team have worked with regular men on other teams, so accordingly some half accidents appear on the record.

INDIVIDUAL ACCIDENT CAMPAIGN

The second method for the reduction of accidents is entirely independent of the team contest just described, although supplementary to it. This is an individual campaign among the trainmen, which was begun May 1 in order to give an incentive to the individual to prevent accidents, even though the team to which he is assigned in the contest may be at the bottom.

The plan consists of a series of cash rewards paid each man who is able to go through an entire month or longer without an accident. In case his record is clear for one month his account is credited with $1. A second consecutive month without an accident gives him an additional credit of $2, while a third month with no accident gives a further credit of $3. For each successive month in which his record is free from any accident he is given a credit, increasing at the rate of $1 a month, until the tenth month is reached, for



OUR ROAD IS ONE OF THE BEST HELP MAKE IT THE SAFEST

QUARTERLY ACCIDENT REPORT West Penn Railways

CONNELLSVILLE DIVISION FIRST QUARTER 1923

JANUARY FEBRUARY

KEY
A Collisions with Vehicles
B Collisions with Persons
C Collisions with Animals
D Collisions with Electric and Motor Vehicles
E Collisions with Cars
F Cars left Track
I Boarding and Alighting Moving Car
K Boarding and Alighting Stat'y Car
L Fell in, on or off Car
M Fell off Car on Curve

TEAMS
BATTONFIELD
RUST
BROOKS
GRIM
DURIE
MARTZ
DECKER
SEMONES
FREEMAN GEO.
BIEBER
FREEMAN F.E.
BLOOM
FUEHRER
DAWSON
FORD
FRAZIER
FOGLE
HOUCH

GORE
GOE
HEBENTHAL
LONG
JAYNES
CONNELLY
KEATING
PYLE D.A.
KERNS
KING
WOODS C.S.
LEASURE C.A.
WATSON
MOORE
FLETCHER
HILES
WILLIAMS

MICHAEL L.S.
MORRIS
CARNES
MICHAEL L.R.
FINDLEY
MILLER
BRYNER
NICHOLS
PYLE F.G.
PRINKEY
TAYLOR J.F.
PIRL
GORE

WITEMOUR

HEADS UP FOR A BETTER RECORD — KEEP YOUR LINE CLEAR NO ACCIDENTS

This Record Is Placed on a Bulletin Board in the Division Carhouses, and the Individual Accident Reports Are Posted on It

which the amount will be $10. For each consecutive month thereafter in which his accident record is clear he will get a credit of $10.

In order to have a sufficient amount of money accumulated that it will mean something worth while to the individual, settlement is made quarterly instead of monthly. That is, when a man has gone through the first three months without an accident he is paid $6. If he continues through the next three months without an accident his payment is $15. At the end of the ninth month with a clear record he gets $24 for the third quarter. At the completion of the twelfth consecutive month free from accidents the amount due for the fourth quarter would be $30, but in addition a cash prize of $25 is included for the full year with a perfect record, making a total payment of $55. Each man who goes through an entire year without an accident thus gets a cash reward of $100 for his accomplishment.

If the same man should continue through a second year with a clear accident record he would get $30 at the end of each quarterly period, but at the end of the twenty-fourth month he would be entitled to an extra $30 for completing a second accidentless year, making a total payment for this year of $150. It is planned to follow the same schedule of payments for each subsequent year a trainman has a clear accident record.

When a man has an accident charged against him he automatically loses his standing, but is paid according to the schedule for all previous months during which he had a clear record. Then he has to begin all over again, starting with the $1 payment for his first clear month and working up as before.

For consideration as a full month, a regular man has to work a total of 225 hours, and an extra man 200 hours. Most of the men, however, work nearly every day on the cars. If a man is off duty a part of the month and has no accidents during the time he is at work that month is dropped out of the calculation and the record is continued with the next full month.

These two methods of accident prevention have not only developed a spirit of rivalry among the men, but have made them exceedingly careful to avoid unsafe practices. There was some fear before the contest was begun that there would be a tendency to neglect in the reporting of accidents, but this has not been borne out in practice. There are too many chances that the "blind" accident may become known if a claim is filed against the company for the trainman to risk his own and his team's record by neglecting to report an accident. It is found that the company gets better accident reports now than formerly, and that in addition all accidents are investigated.

SHOPS AND OTHER DEPARTMENTS ENLISTED

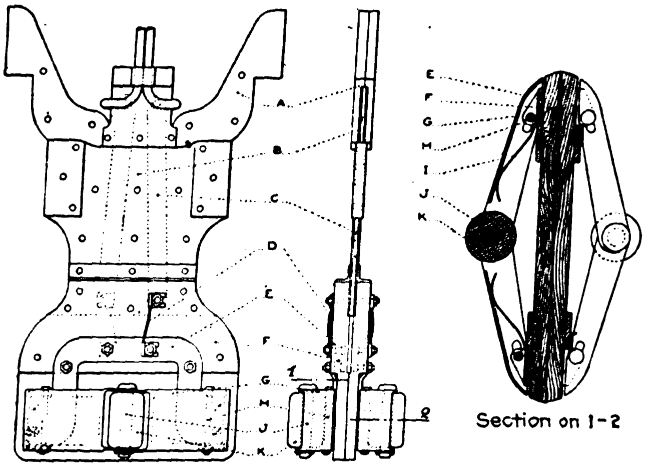
First-aid teams also have been recruited among the crews and in the shops. These first-aid crews look over the unsafe practices of the company. They investigate all accidents in the shops and do their best to determine the causes, so that future accidents of the same character may be avoided. This has resulted in the men examining every potential accident breeder in and about the shops. Bad practices of all sorts have been eliminated. Another effect has been that everything in the shop that might be dangerous is well guarded. The men, both on the cars and in other departments, have come to do safe things automatically. Conductors, for instance, help old people on and off the cars. Flagging of railroad crossings now really means something. Whereas in the old days this was merely perfunctory, and gave only a false sense of security, the conductor now looks both ways to see if the track is clear before he signals the motorman to cross. Such things as this indicate that the campaign really has been worth while.

RESULTS OF THE CAMPAIGN

The work which has been done up to date and the results obtained by the men indicate that these contests will cut the number of accidents for this year to about one-half of what they were last year. Serious accidents are reduced, as well as minor ones. It is difficult to give any figures for the cost of the plan or the amount it will save, as the work is just well under way and the results in both accounts depend on continuous freedom from accident. It has been figured, however, that if all the men are free from accident a sufficient number of months to be drawing the maximum reward, the total expenditure on this account will be between one-fourth and one-third the present payments for accidents and damages, while the latter will be reduced to nothing. This of course represents an ideal impossible of attainment in practice, but it goes to indicate that the possible savings to the company are large compared with the cost of the plan.

Novel Conduit Plow Used in Nice

IN A recent article in *L'Industrie des Tramways, Chemins de Fer et Transports Publics Automobiles*, Jacques Schopfer, superintendent of equipment of the Nice, France, tramways, has described a novel form of contact plow for conduit railways which was designed by an employee of his company. This plow has been used successfully in Nice, even with the local conduits in a run-down condition resulting from the war.



Plow for Use on Conduit Railways. Contact Devices Are Rollers Rather than the Shoes Generally Employed

KEY TO LETTERS ON DIAGRAM:
A. Steel ears for use in attaching plow to car.
B. Thin steel plates forming shank.
C. Flat insulated electric conductor.
D. Fuse.
E. Support for roller, bolted to insulating block.
F. Block of wood or fiber supported from shank and carrying rollers.
G. Link for carrying roller.
H. Bearing pin for links, which are slotted near end.
I. Spring for pressing roller against contact bar.
J. Roller axle.
K. Steel roller.

The novel feature is the use of contact rollers in place of the shoes customary in this country. The rollers are mounted on steel links as shown in the diagram, being pressed outward by strong springs. Each roller with its links is mounted on a sheet steel piece of the form shown at *E*, which is bolted on one side of a double insulating block of impregnated wood or fiber *F*. The upper part of the plow is built up of sheet steel, the shank being made of two thin plates separated by a space to accommodate the flat electric conductors.

After a trial of the plows on twenty-five cars for some time, the Nice company decided to install them on all city cars and later to extend their use to all of the rolling stock.

Transfer Abuse Reduced in Boston

Good Results Follow the Introduction of a Type of Transfer Which Has a Time Limit but Requires No Punching by the Conductor

BY J. H. MORAN
General Auditor Boston Elevated Railway

UNTIL recently the transfer used in Boston was similar in general type to that used in a great many cities in this country, but as the number of routes and transfer points increased, this form became more complicated. It was difficult for conductors, no matter how conscientious they might be, to punch the transfers properly, and it was equally difficult for the collecting conductors to make a proper examination of them, particularly during heavy traffic hours and at prepayment stations. A typical transfer of this type is reproduced in the first cut on page 10. A glance will show that there was some foundation to the claim of a newspaper paragrapher who declared that he was using one in his office as a calendar, since it contained everything a calendar did and more as well. To show that the railroad difficulties with this transfer were great it need only be pointed out that four separate punching operations were required before the conductor could properly issue the transfer.

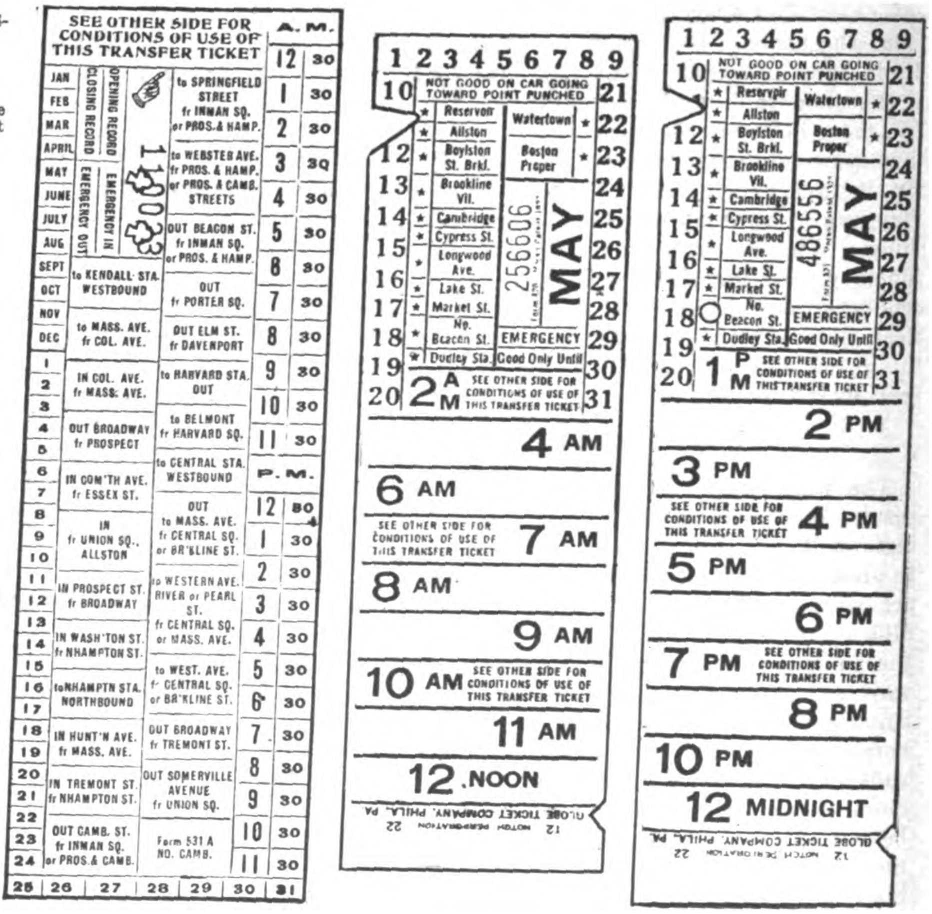
With the increase in traffic and the seating capacity of cars, and later with the introduction of one-man cars, the burden of issuing and checking these transfers naturally became a large one. In its study of this problem the company made a canvass from time to time of the transfers collected at various points. Table I gives a typical example of conditions found to exist. It will be seen that nearly 25 per cent of the transfers received had no time limit and were in effect unrestricted passes.

The actual loss in revenue resulting from such an opportunity for misuse cannot of course be accurately determined. However, the Boston Elevated Railway operates at present approximately 5,000,000 round trips per year on its surface lines, and if only one transfer is fraudulently used on each of these trips, the loss in revenue would be $500,000 a year.

To relieve this situation some means of reducing the defects in the existing transfer system had to be devised. It was plainly evident that a transfer, to be effective, must be one that would combine simplicity

TABLE I—RECORD OF OLD TYPE OF TRANSFERS RECEIVED AT DUDLEY STREET TERMINAL—WEST LOOP—JAN. 5, 1922

—— Time ——		Total Transfers Received	Wrong Date	No Date	Expired Time Limit	No Time Limit
A.M.						
5:15	5:30	...	..	..	..	...
5:30	6:00	3	..	..	..	...
6:00	6:30	5	2	..	..	...
6:30	7:00	16	..	..	..	1
7:00	7:30	38	2	..	1	2
7:30	8:00	33	2	..	1	7
8:00	8:30	38	..	..	..	6
8:30	9:00	77	..	..	..	19
9:00	9:30	13	1	..	..	1
9:30	10:00	36	..	..	1	14
10:00	10:30	54	..	..	1	13
10:30	11:00	28	..	..	..	1
11:00	11:30	22	..	..	..	3
11:30	12:00	35	..	..	..	4
P.M.						
12:00	12:30	25	..	2	..	4
12:30	1:00	33	2	1	2	7
1:00	1:30	16	..	..	2	2
1:30	2:00	73	1	1	..	11
2:00	2:30	33	1	..	1	8
2:30	3:00	59	..	..	1	9
3:00	3:30	64	2	2	3	9
3:30	4:00	72	..	1	1	14
4:00	4:30	78	..	..	3	19
4:30	5:00	75	..	..	2	20
5:00	5:30	165	..	2	1	13
5:30	6:00	114	..	..	5	10
6:00	6:30	69	2	..	7	6
6:30	7:00	68	..	..	2	9
7:00	7:30	98	4	..	11	8
7:30	8:00	77	1	..	5	4
8:00	8:30	65	5	1	..	13
8:30	9:00	63	1	..	3	11
9:00	9:30	41	..	..	..	9
9:30	10:00	51	3	..	9	14
10:00	10:30	35	2	..	..	3
10:30	11:00	45	..	..	..	10
11:00	11:30	25	..	..	1	3
11:30	12:00	44	..	..	..	17
A.M.						
12:00	12:30	20	..	..	1	1
12:30	1:00	64	..	..	..	45
Total..........		1,970	31	10	64	350


SEE OTHER SIDE FOR CONDITIONS OF USE OF THIS TRANSFER TICKET
A. M.
P. M.
CLOSING RECORD
OPENING RECORD
EMERGENCY OUT
EMERGENCY IN
to SPRINGFIELD STREET fr INMAN SQ. or PROS. & HAMP.
OUT BEACON ST. fr INMAN SQ. or PROS. & HAMP.
to KENDALL STA. WESTBOUND
OUT fr PORTER SQ.
to HARVARD STA. OUT
IN TREMONT ST. fr NHAMPTON ST.
OUT SOMERVILLE AVENUE fr UNION SQ.
Form 531 A NO. CAMB.
1 2 3 4 5 6 7 8 9
NOT GOOD ON CAR GOING TOWARD POINT PUNCHED
Reservoir
Allston
Boylston St. Brkl.
Brookline Vil.
Cambridge
Cypress St.
Longwood Ave.
Lake St.
Market St.
No. Beacon St.
Dudley Sta.
Watertown
Boston Proper
EMERGENCY
Good Only Until
256606
486556
MAY
4 AM
6 AM
7 AM
8 AM
9 AM
10 AM
11 AM
12 NOON
2 PM
3 PM
4 PM
5 PM
6 PM
7 PM
8 PM
10 PM
12 MIDNIGHT
GLOBE TICKET COMPANY, PHILA., PA.

At Left, Old Transfer. In Center, New A.M. Transfer. At Right, New P.M. Transfer

of issue with possibility for careful but rapid scrutiny at the time of its collection. With these ends in view, the types of transfer shown in the second and third engravings have been adopted and are now in general use throughout the system.

A distinctive color is used for the A.M. and P.M. transfer in each of the four operating divisions. The month is printed in large type and contrasting color on the face of the transfers, and the date is notched at the station before transfers are issued to the conductors. The time limit is indicated by perforated coupons, and the transfers are stapled at the bottom so that the conductor in issuing tears them off at the proper perforation, leaving on the stub the remainder of the ticket. Before starting on his trip the conductor punches the starting point, so that when issuing the transfer to the passenger no further operation is required than to tear the ticket off at the proper place. These features have made it possible for the conductor or station attendant collecting the transfers to determine readily whether the transfer is valid and is being presented for fare before the expiration of the time limit, since it presents for his examination a ticket varying in size at different hours of the day.

TABLE II—RECORD OF NEW TYPE OF TRANSFERS RECEIVED AT DUDLEY STREET—WEST LOOP—THURSDAY, APRIL 5, 1923

—— Time ——		Total Transfers Received	Wrong Date	No Date	Expired Time Limit	No Time Limit
A.M.						
5:00	6:00	4	..	..	..	...
6:00	7:00	33	..	..	..	...
7:00	8:00	89	..	..	..	...
8:00	9:00	128	2	..	..	...
9:00	10:00	71	..	..	..	...
10:00	11:00	50	1	..	..	...
11:00	12:00	52	..	..	..	...
P.M.						
12:00	1:00	69	..	..	..	...
1:00	2:00	70	..	..	1	...
2:00	3:00	133	2	..	..	...
3:00	4:00	93	1	..	..	...
4:00	5:00	137	1	..	3	...
5:00	6:00	326	..	...	7	...
6:00	7:00	238	..	..	4	...
7:00	8:00	113	2	..	9	...
8:00	9:00	70	1	..	8	...
9:00	10:00	87	1	..	8	...
10:00	11:00	83	..	..	5	...
11:00	12:00	76	..	..	..	...
A.M.						
12:00	12:40	30	..	..	2	...
Total........		1,952	11	..	47	0

That the adoption of this type of transfer has to a considerable extent resulted in the correction of the widespread opportunity for abuse which previously existed is shown by Table II, which is a tabulation of transfers collected after the new transfer was put in use.

In addition to minimizing the abuse incidental to their use the decrease in the number of forms required under the new type and the elimination of waste brought about by the improved method of dating has resulted in a saving to the Boston Elevated of $25,000 in the cost of printing transfers this year.

The success attending the use of this transfer on the Boston Elevated Railway has come to the attention of other railways and arrangements have already been made for its adoption on other systems.

Tests of Hydraulic-Turbine Draft Tubes

THE UNITED STATES War Department, Corps of Engineers, has recently made a series of tests of the efficiency of draft tubes for hydraulic turbines. The tests were under the direction of Col. Hugh L. Cooper and were made in the I. P. Morris laboratory of the William Cramp & Sons Ship & Engine Building Company, Philadelphia, which was loaned to the War Department for the purpose. The equipment for the tests consisted of a standard model turbine installation of the usual mixed-flow type, the turbine being direct-connected to an Alden dynamometer. A series of different draft tubes was successively inserted, affording a direct comparison of efficiency for different designs. It is understood that a full report will soon be published.

Carrying Safety to the Public—IX*

The Police Are an Important Factor in Any Safety Program—Methods of Organizing the Traffic Men and Instructing Them Are Discussed—A Traffic Survey Is Also Essential

By C. W. Price

Vice-President in Charge of Public Safety,
Elliott Service Company, New York City

THE police force in any community, large or small, constitutes a unique group of citizens which is placed in a strategic position to do more to safeguard the streets than any other like number of persons. In most cities the police are under a constant fire of criticism and attack, and by the majority of citizens are held responsible for many conditions over which they have little control. The fact that the records of accidents in all cities indicate that only a small percentage of accidents happen at or near a point where a traffic officer is located is convincing evidence that the officers are at least endeavoring to do their duty.

The great majority of citizens do not appreciate the fact that in the last analysis the traffic officers on the streets are able to regulate traffic and to enforce the laws only in so far as, first, public opinion will allow them to enforce the laws, and, second, only in so far as the people will back them up in the enforcement of the law. In other words, the police are merely servants and not masters of the people and do only what the majority of the people want them to do. In every city where, through a safety campaign, public sentiment has been awakened on safety there has followed immediately an improved law enforcement by the police.

In the initial stages of organizing an accident prevention movement it is essential that the chief of police and the chief of traffic should be given recognition and places on the executive committee. They should be made to feel that the police force is to play an important part in the safety campaign, and that the safety council proposes to back the department in its efforts to enforce the law. In the publicity campaign every opportunity should be utilized to express proper recognition and appreciation of the efforts of the police department. This will help to counteract unfair criticism and to encourage the department to co-operate wholeheartedly in the campaign. The following has proved to be a most successful method of reaching quickly all of the members of the police force and securing their intelligent co-operation. Through the chief of police arrangements should be made for a ten or fifteen-minute safety program in each of the police stations at rollcall once a month. At these meetings the chief should speak and should urge his men to go the limit in enforcing the law. A representative of the safety council also should speak and emphasize the following:

> A community-wide education campaign is the only solution of the accident problem.
>
> The scope and purpose of the campaign that is under way.
>
> The campaign is backed by the best citizens and the co-operation of all the civic agencies has been secured.
>
> The success of the campaign will mean a changed attitude on the part of the public toward the police officers. The police officers will come to be respected as useful servants of the people, and the backing of public opinion will make their work much easier and more pleasant.

The Traffic Police Are a Vital Factor in the Work of Accident Prevention

In a number of cities the safety council has offered a gold medal for the police officer who did the most heroic act during the year in saving human life. The presentation of the medal is made a public occasion and the presentation is made by the Mayor with a brief address reciting the heroic deed which merited the medal. This, of course, offers a good story for publicity in which an encouraging word of recognition of the work of the police department properly can be spoken. During the Safety Week campaign each policeman should wear a button on which is inscribed, "We are helping to make —— (the name of the city) safe." The police should also be given a prominent place in the safety parade.

The safety council can render a valuable service to the police department by furnishing information from time to time in regard to what the police departments in other cities are doing to promote safety. The chief of police will always appreciate help of this kind.

Detroit furnishes a good example of the service which a police department can render in promoting public safety. Not only has the police department co-operated with the safety council, automobile club and other organizations which have united in a great community effort, but the police commissioner, Dr. J. W. Inches, has been one of the leaders in the safety campaign since its inception. Through his leadership the police department has worked in the closest co-operation with the schools in promoting safety among the children. The department has distributed hundreds of thousands of pieces of safety literature; has installed an efficient block system with towers, flashlights and bells at the street intersections; has established an accident bureau with twenty trained traffic men, who, the moment an accident occurs, immediately go to the scene and ascertain the cause of and the responsibility for the accident. The police department has established a light testing laboratory which gives free service, and has done some pioneer work in developing better parking conditions, in laying out one-way streets and in installing safety islands, beacon lights and other safety devices at important street intersections.

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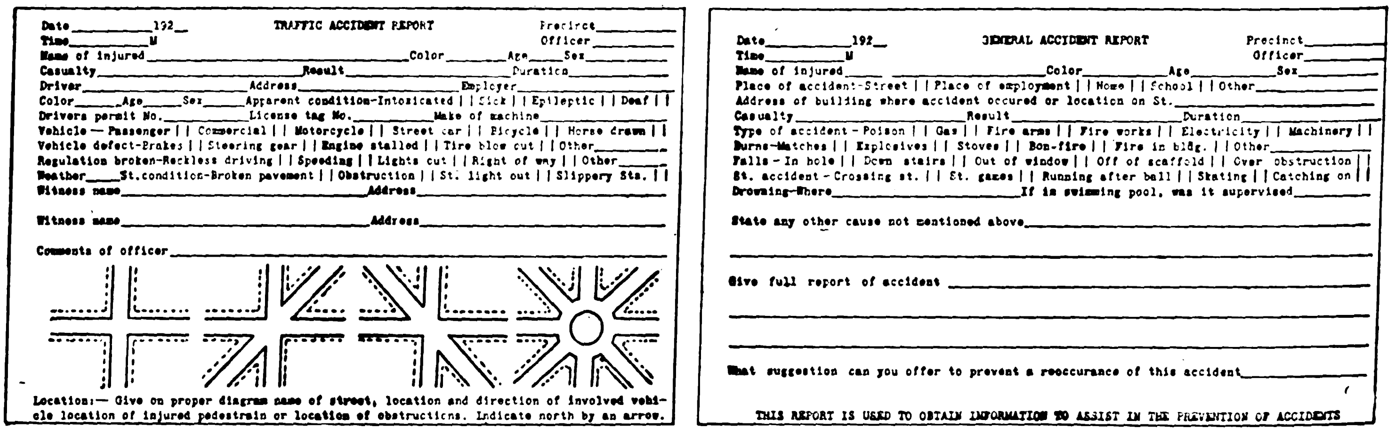
*Ninth of a series of ten articles.

In most cities the records of the police department furnish the most reliable source of information regarding the accident experience. However, in many cities there is a lamentable lack of adequate statistical information regarding causes of accidents. Just as it was true in accident prevention work in industries that the proper analysis of the accident experience by causes was absolutely indispensable to any intelligent and constructive effort toward prevention, so it is equally true that in an organized community effort to prevent public accidents it is necessary each month to have a complete analysis of the accident experience of the previous month. In making this analysis, this one point should be kept in mind: the figures should always point to the remedy. For instance, in a given case where a child was killed, you need to know that the child was killed by a truck; that it was killed while chasing a ball into the street; that the child was a boy five years of age; that it was 8 o'clock in the evening and dusk; that the street was slippery, and that it was not the fault of the driver.

For instance, how illuminating is the analysis made by Dr. E. George Payne of the accident experience in St. Louis. He found that there were four principal causes of accidents to children on the street: Dashing out into the street after a ball, catching onto motor vehicles or street cars, playing in the street and crossing the street without looking to the left or right. With this information in hand, the mother or the teacher can instruct and train the children much more intelligently because their efforts can be concentrated upon these four causes.

An analysis of the accident experience in New York city in 1922 revealed that 85 per cent of the deaths on the street occurred at other points than at street intersections. A study made of the accident experience in the State of Connecticut for 1922 established that 91 per cent of the accidental deaths on the streets and highways were due to "jaywalking." These two facts instantly dispel a lot of the loose talk about its being "up to the police," and point unmistakably to the need of an educational campaign which will reach the individual pedestrian and the individual driver, and make them appreciate their responsibility in safeguarding their own lives and the lives of others.

On this page is shown the report form prepared by W. Graham Cole, secretary Washington Safety Council, and recommended for use by the police department in obtaining accurate information to serve as a guide in the prevention of accidents. This form includes every item that is needed by the Safety Council in promoting educational safety and in suggesting traffic regulations. The form is convenient for use by the policeman because it calls for the minimum amount of writing, practically all of the items needing only to be checked. The forms used by the policeman are printed on paper, and these are copied on cardboard duplicates which become a part of the permanent file in the police department. At the end of each month it is a simple matter to tabulate on a form the entire accident experience of the previous month.



TRAFFIC ACCIDENT REPORT

Date ________ 192__ Precinct ________
Time ________ M Officer ________
Name of injured ________ Color ______ Age ____ Sex ____
Casualty ________ Result ________ Duration ________
Driver ________ Address ________ Employer ________
Color ____ Age ____ Sex ____ Apparent condition-Intoxicated ☐ Sick ☐ Epileptic ☐ Deaf ☐
Drivers permit No. ________ License tag No. ________ Make of machine ________
Vehicle — Passenger ☐ Commercial ☐ Motorcycle ☐ Street car ☐ Bicycle ☐ Horse drawn ☐
Vehicle defect-Brakes ☐ Steering gear ☐ Engine stalled ☐ Tire blow cut ☐ Other ________
Regulation broken-Reckless driving ☐ Speeding ☐ Lights cut ☐ Right of way ☐ Other ______
Weather ____ St.condition-Broken pavement ☐ Obstruction ☐ St. light out ☐ Slippery Sts. ☐
Witness name ________ Address ________

Witness name ________ Address ________

Comments of officer ________

Location:— Give on proper diagram name of street, location and direction of involved vehicle location of injured pedestrain or location of obstructions. Indicate north by an arrow.

GENERAL ACCIDENT REPORT

Date ________ 192__ Precinct ________
Time ________ M Officer ________
Name of injured ________ Color ________ Age ________ Sex ________
Place of accident-Street ☐ Place of employment ☐ Home ☐ School ☐ Other ________
Address of building where accident occured or location on St. ________
Casualty ________ Result ________ Duration ________
Type of accident - Poison ☐ Gas ☐ Fire arms ☐ Fire works ☐ Electricity ☐ Machinery ☐
Burns-Matches ☐ Explosives ☐ Stoves ☐ Bon-fire ☐ Fire in bldg. ☐ Other ________
Falls - In hole ☐ Down stairs ☐ Out of window ☐ Off of scaffold ☐ Over obstruction ☐
St. accident - Crossing st. ☐ St. games ☐ Running after ball ☐ Skating ☐ Catching on ☐
Drowning-Where ________ If in swimming pool, was it supervised ________

State any other cause not mentioned above ________

Give full report of accident ________

What suggestion can you offer to prevent a reoccurance of this accident ________

THIS REPORT IS USED TO OBTAIN INFORMATION TO ASSIST IN THE PREVENTION OF ACCIDENTS

Front and Reverse Sides of Form for Reporting Accidents. This Form, Carried by the Policeman, Is Designed to Provide Full Information with a Minimum of Writing

In most cities a revision of traffic regulations is either under way or is contemplated. The analysis of accident experience, covering a period of one or more years, will furnish invaluable data on which to base new traffic regulations. As suggested in previous articles, this analysis of accident experience should be given wide publicity in the newspapers, should be placed in the hands of all teachers and presidents of women's clubs, and should be used in the school for drivers and in the school for foremen.

In line with this consideration of the need of complete information in regard to accident experience should also be mentioned the need of a traffic survey by some one who has the education and experience to make it. The profession of traffic engineering is as yet in its infancy. Only in a few cities has there been any attempt to make scientifically a thoroughgoing survey of the traffic situation. Just as it is true that a complete analysis of accident experience is indispensable, so is it true that a thoroughgoing and scientific study both of the physical conditions on the streets and of the movement of traffic must be made before it will be possible to work out a final solution of the traffic problem. For instance, one of the most pressing questions in the average city is that of diverting heavy traffic away from the more congested sections. Before this can be answered it will be necessary to make a very careful study of the movements of heavy traffic, the starting points and the destinations, and so to reroute that not only will it cause a minimum of inconvenience, but that in general the movement of all traffic will be facilitated. In this connection a rerouting of the street cars may sometimes be made to reduce the congestion at some of the most dangerous intersections.

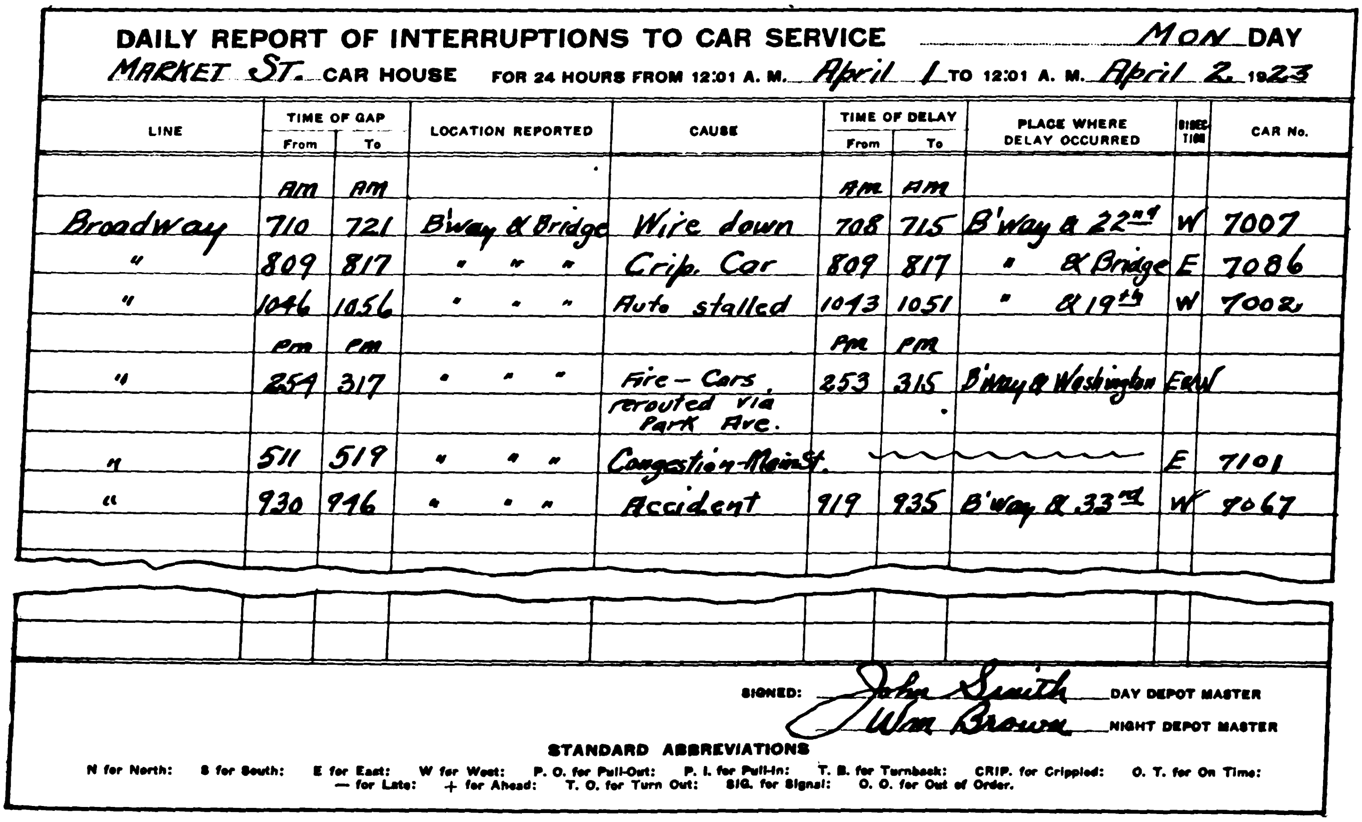
The problems of parking, of one-way streets, installing beacon lights, iron policemen or other devices at street intersections properly to direct the traffic, all call for not only a careful but a scientific study before any satisfactory solution can be offered. The recommendations of the police departments and others in many cities for changes in traffic regulations or improvements in street conditions many times have failed to be adopted, or when adopted have not secured the support of the public, because the recommendations were not based upon a careful study of conditions. In many cities the people are alarmed because of the increase in accidents, and all sorts of half-baked remedies are being offered. It is highly important that the officers of the safety council should endeavor to call a halt on all of these sporadic efforts at reform and to insist, before any steps are taken to remedy the situation, that an intelligent and thoroughgoing effort be made to get at the facts regarding the accident experience, the street conditions and the movement of traffic.

Making Daily Service Reports Accurate

New Methods Will Be Tried for Checking Headways, and New Forms Used for Tabulating Delays and Gaps

EVERY electric railway keeps some sort of record of delays and interruptions to service. In the case of a street railway operating numerous lines on short headways, it becomes a rather complicated matter to secure complete and accurate information concerning the service, and to present it quickly and in a convenient form. One large company in the East has just finished a careful study of this problem, and has made extensive changes in the methods of collecting and tabulating such information.

A general impression among the officials of the railway in question had existed for a long time prior to the change that the daily car service reports were not entirely accurate and adequate. As an initial step toward improvement, it was decided to find out exactly how bad the situation was. Two Nachod headway recorders which had been installed, one on each of two important city lines, were utilized in the work. The daily recorder charts showing the exact time every car passed the instrument were preserved for a month and a list was prepared from them of all interruptions to service greater by five minutes than the scheduled headway. This list was then compared with the daily car service reports which were supposed to explain all gaps of five minutes over headway, to determine what proportion of the actual number of gaps were shown on the latter and to see how well the cause was explained in each case.



DAILY REPORT OF INTERRUPTIONS TO CAR SERVICE MON DAY

MARKET ST. CAR HOUSE FOR 24 HOURS FROM 12:01 A. M. April 1 TO 12:01 A. M. April 2 1923

LINE	TIME OF GAP		LOCATION REPORTED	CAUSE	TIME OF DELAY		PLACE WHERE DELAY OCCURRED	DIRECTION	CAR No.
	From	To			From	To			
	Am	Am			Am	Am			
Broadway	710	721	B'way & Bridge	Wire down	708	715	B'way & 22nd	W	7007
"	809	817	" " "	Crip. Car	809	817	" & Bridge	E	7086
"	1046	1056	" " "	Auto stalled	1043	1051	" & 19th	W	7002
	pm	pm			Pm	pm			
"	254	317	" " "	Fire – Cars rerouted via Park Ave.	253	315	B'way & Washington	E&W	
"	511	519	" " "	Congestion-Main St.				E	7101
"	930	946	" " "	Accident	919	935	B'way & 33rd	W	7067

SIGNED: John Smith DAY DEPOT MASTER
Wm Brown NIGHT DEPOT MASTER

STANDARD ABBREVIATIONS

N for North: S for South: E for East: W for West: P. O. for Pull-Out: P. I. for Pull-In: T. B. for Turnback: CRIP. for Crippled: O. T. for On Time: — for Late: + for Ahead: T. O. for Turn Out: SIG. for Signal: O. O. for Out of Order.

New Form Designed to Facilitate Preparation of Reports of Car Delays or Interruptions to Schedule

The only uncertain element that entered into the question was due to the fact that it is not possible with the

Nachod headway recorder to identify the individual cars. The passage of a sand car may be mistaken for the passage of a regular passenger car. But an interval in which no cars whatever pass, on the other hand, can mean only an actual interruption to service. By the use of such a mechanical recording device the chance of human error is eliminated. Inasmuch as the purpose of the investigation was only to make a comparison of the actual gaps with those reported by the carhouses, and not to compare the service with the schedule, the instrument was well suited to the work.

At the end of the month it was found that approximately one-third of the gaps were thoroughly explained, one-third were more or less admitted but only vaguely explained, and one-third were not mentioned at all in the daily car service reports. It was therefore evident that the reports as then prepared possessed little value. The principal reason why the records did not explain more exactly the irregularities of operation during the period of the test seemed to be that there was no comprehensive system of reporting gaps and delays to the various carhouses.

These reports were made sometimes verbally, sometimes by telephone, and sometimes in writing. They were made either by the car crew or by a street inspector, or by both. The amount and accuracy of the information given depended upon the individual. Either the station master, an inspector, or a clerk, received and noted the report. After midnight a summary of the interruptions to service during the day was telephoned from each carhouse to the general office, where it was typewritten. Thus there were many chances for errors to occur, not only of commission but also of omission, and the investigation showed that as a matter of fact they were occurring very frequently.

REAL PURPOSE IS TO SHOW GAPS

As a first step in the direction of better daily car service reports, it was essential that the real purpose of the reports should be thoroughly understood. Confusion had existed as to whether they were "delay" reports, or "gap" reports. Some carhouses were habitually noting a situation where all cars were delayed by general conditions and were running several minutes behind schedule, although the headway between any two cars was about right. Other carhouses took note only of the actual gaps. It was immediately decided that the primary object should be to record interruptions to service. Delays that caused no gaps on the line were ruled out of the picture.

It became clear, as a consequence of this decision, that an efficient method of checking headways would have to be devised. While it may be possible to get an accurate report from trainmen of all serious delays, no motorman with the best intentions in the world can always tell exactly how long a headway he has. An accurate headway check can be made only by observation at a fixed point. A strategic point was chosen where each line was to be checked for twenty-four hours a day. By locating the checking point at the carhouse in some cases, and in other cases at an intersection where there was already a street inspector on duty, it was possible without greatly increasing the personnel to arrange for all lines to be checked. The responsibility of the checker is to include not only an accurate headway record but also a comprehensive explanation of the reasons for all interruptions to service.

Careful thought was given to the preparation of a suitable printed form upon which to summarize the reports of the individual lines, as it would be quite useless to make strenuous efforts to gather the information fully and accurately, unless provision were made also for presenting it quickly and clearly. It was believed that the following items were the most important: Time and duration of gap; location where reported; cause; time and duration of delay, if any; location of delay; direction and car number.

A form shown in the accompanying illustration was designed and printed in pads of handy size.

The procedure of preparing the daily car service report is now as follows: The actual headway record taken on the street by the checker is handed in at the carhouse when he goes off duty. The depot master notes on the daily sheet every gap five minutes greater than scheduled headway, together with all pertinent information concerning it. Not all of the columns of the form are necessarily used because a gap may sometimes occur without any actual standing delay. For example, the failure of one car to pull out from the carhouse in its proper place might give the scheduled following car a double headway without there being any delay to that car at all. Similarly, a delay affecting only one car might occur without any corresponding interruption to service if remedial measures were promptly taken. It is not the plan, however, to devote attention to delays that cause no interruption to service.

Each carhouse prepares the daily car service report covering the twenty-four hours from midnight to midnight in triplicate, each copy being of a color different from the others. The forms are filled out shortly before the end of the period, and as soon as the last word has come in from the man on the street, two copies are put into the special railway mail, one for the division superintendent and one for the general superintendent. The reports are on the desks of the officials early the next morning.

The introduction of this system has assured that practically all interruptions to service will be reported, and that an adequate explanation of the cause of each one will accompany the report. Moreover, the convenience of the form increases the likelihood that all the information will be included in the record, and the substitution of mail for telephone has eliminated a fruitful source of error without seriously delaying the hour of presentation of the report.

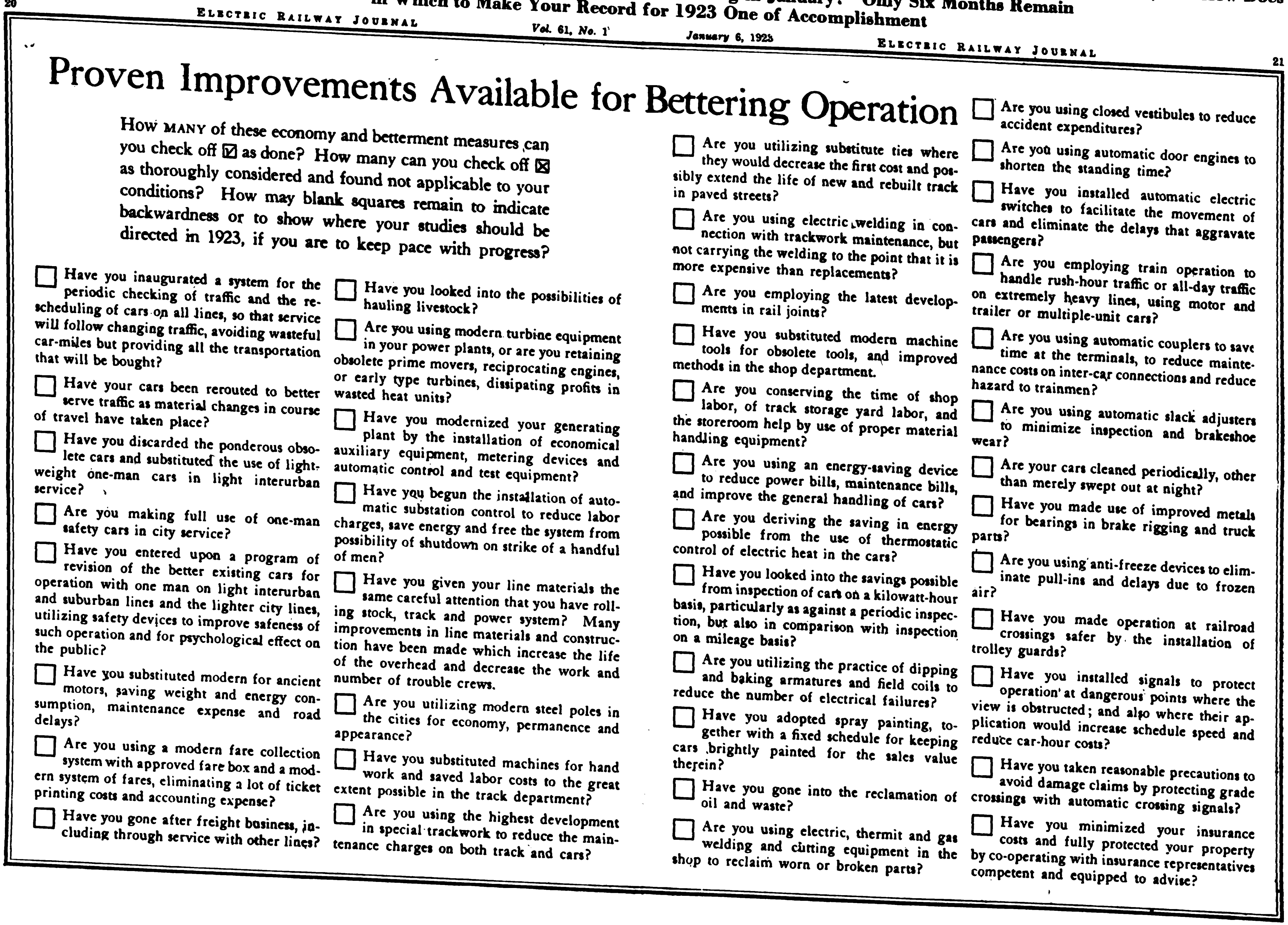
Long 33,000-Volt Cable in Scotland

A 33,000-VOLT cable, 15½ miles long, has recently been installed on the Clyde Valley System and is used as an interconnection between the Yoker and Clyde Mill power stations near Glasgow. This cable was constructed by the Pirelli General Cable Works, Ltd., a subsidiary of the General Electric Company, Ltd., Southampton.

The cable is three-core, each core being 0.2 sq.in. in cross-sectional area. The cable is paper insulated around individual conductors, with an outside belt of impregnated paper. It is lead-sheathed, compounded jute served, double steel-tape armored, and compounded jute served over all.

Protection against the development of a fault in the cable is provided by the installation of the "G.E.C. biased differential protective system," which automatically cuts out the cable when a fault causes a predetermined percentage difference in current at the two ends.

Since This Summary of Improvement Suggestions Was Published Six Months Have Passed. How Many Items Can You Now Check Off, and How Does the Number of Blank Squares Compare with Your Standing in January? Only Six Months Remain in Which to Make Your Record for 1923 One of Accomplishment



20 ELECTRIC RAILWAY JOURNAL Vol. 61, No. 1 January 6, 1923 ELECTRIC RAILWAY JOURNAL 21

Proven Improvements Available for Bettering Operation

HOW MANY of these economy and betterment measures can you check off ☑ as done? How many can you check off ☒ as thoroughly considered and found not applicable to your conditions? How may blank squares remain to indicate backwardness or to show where your studies should be directed in 1923, if you are to keep pace with progress?

☐ Have you inaugurated a system for the periodic checking of traffic and the rescheduling of cars on all lines, so that service will follow changing traffic, avoiding wasteful car-miles but providing all the transportation that will be bought?

☐ Have your cars been rerouted to better serve traffic as material changes in course of travel have taken place?

☐ Have you discarded the ponderous obsolete cars and substituted the use of light-weight one-man cars in light interurban service?

☐ Are you making full use of one-man safety cars in city service?

☐ Have you entered upon a program of revision of the better existing cars for operation with one man on light interurban and suburban lines and the lighter city lines, utilizing safety devices to improve safeness of such operation and for psychological effect on the public?

☐ Have you substituted modern for ancient motors, saving weight and energy consumption, maintenance expense and road delays?

☐ Are you using a modern fare collection system with approved fare box and a modern system of fares, eliminating a lot of ticket printing costs and accounting expense?

☐ Have you gone after freight business, including through service with other lines?

☐ Have you looked into the possibilities of hauling livestock?

☐ Are you using modern turbine equipment in your power plants, or are you retaining obsolete prime movers, reciprocating engines, or early type turbines, dissipating profits in wasted heat units?

☐ Have you modernized your generating plant by the installation of economical auxiliary equipment, metering devices and automatic control and test equipment?

☐ Have you begun the installation of automatic substation control to reduce labor charges, save energy and free the system from possibility of shutdown on strike of a handful of men?

☐ Have you given your line materials the same careful attention that you have rolling stock, track and power system? Many improvements in line materials and construction have been made which increase the life of the overhead and decrease the work and number of trouble crews.

☐ Are you utilizing modern steel poles in the cities for economy, permanence and appearance?

☐ Have you substituted machines for hand work and saved labor costs to the great extent possible in the track department?

☐ Are you using the highest development in special trackwork to reduce the maintenance charges on both track and cars?

☐ Are you utilizing substitute ties where they would decrease the first cost and possibly extend the life of new and rebuilt track in paved streets?

☐ Are you using electric welding in connection with trackwork maintenance, but not carrying the welding to the point that it is more expensive than replacements?

☐ Are you employing the latest developments in rail joints?

☐ Have you substituted modern machine tools for obsolete tools, and improved methods in the shop department.

☐ Are you conserving the time of shop labor, of track storage yard labor, and the storeroom help by use of proper material handling equipment?

☐ Are you using an energy-saving device to reduce power bills, maintenance bills, and improve the general handling of cars?

☐ Are you deriving the saving in energy possible from the use of thermostatic control of electric heat in the cars?

☐ Have you looked into the savings possible from inspection of cars on a kilowatt-hour basis, particularly as against a periodic inspection, but also in comparison with inspection on a mileage basis?

☐ Are you utilizing the practice of dipping and baking armatures and field coils to reduce the number of electrical failures?

☐ Have you adopted spray painting, together with a fixed schedule for keeping cars brightly painted for the sales value therein?

☐ Have you gone into the reclamation of oil and waste?

☐ Are you using electric, thermit and gas welding and cutting equipment in the shop to reclaim worn or broken parts?

☐ Are you using closed vestibules to reduce accident expenditures?

☐ Are you using automatic door engines to shorten the standing time?

☐ Have you installed automatic electric switches to facilitate the movement of cars and eliminate the delays that aggravate passengers?

☐ Are you employing train operation to handle rush-hour traffic or all-day traffic on extremely heavy lines, using motor and trailer or multiple-unit cars?

☐ Are you using automatic couplers to save time at the terminals, to reduce maintenance costs on inter-car connections and reduce hazard to trainmen?

☐ Are you using automatic slack adjusters to minimize inspection and brakeshoe wear?

☐ Are your cars cleaned periodically, other than merely swept out at night?

☐ Have you made use of improved metals for bearings in brake rigging and truck parts?

☐ Are you using anti-freeze devices to eliminate pull-ins and delays due to frozen air?

☐ Have you made operation at railroad crossings safer by the installation of trolley guards?

☐ Have you installed signals to protect operation at dangerous points where the view is obstructed; and also where their application would increase schedule speed and reduce car-hour costs?

☐ Have you taken reasonable precautions to avoid damage claims by protecting grade crossings with automatic crossing signals?

☐ Have you minimized your insurance costs and fully protected your property by co-operating with insurance representatives competent and equipped to advise?

Various Valuation Points Considered

In Its Recent Decision on Value for Rate-Making Purposes of the Philadelphia Rapid Transit Property, the Pennsylvania Commission Expresses an Opinion on Many Disputed Points in Valuation

THE general conclusions of the Public Service Commission of Pennsylvania in the Philadelphia Rapid Transit rate case were published on page 1101 of last week's issue of this paper. The hearing conducted by the commission was not definitely to determine the valuation of the property, but whether the present 7-cent cash fare with four tickets for 25 cents was unreasonable, as charged by the city. Hence the commission did not consider it necessary to determine the exact fair value of the property, but did so sufficiently to find that the present fares are not so high but that they may be continued. Consequently the complaint was dismissed.

FAIR VALUE IS PRESENT VALUE

The commission first points out the purposes of a valuation for rate making and declares it is clear that what is to be protected by constitutional guarantees against confiscation is the present value of the property. This means, the commission says, its value at the time of the inquiry, or more properly at the time the rates under consideration are to apply. In defense of this opinion the commission quotes approvingly, among other cases, Minnesota rate cases (230 U. S. 352, 454): "The property is held in private ownership, and it is that property and not the original cost of it, of which the owner may not be deprived without due course of law."

In discussing methods, the commission says:

> While original costs and all these elements have proved probative value, the extent to which they are adopted as controlling is dependent upon the light they throw upon the present fair value of the property, as distinguished from the value at the time of its original construction and acquisition or at any intervening period. . . .
>
> Such change of emphasis as the law has shown in dealing with these two principal indices of present value is due necessarily to the very great change brought about by the war in all price and labor conditions, which up to the present time show little if any tendency to return to their former status. While we must be careful not to accept reproduction costs minus proper depreciation as the sole determining factor and must give due consideration to the possibilities of at least some measure of return to former conditions, we do find that in the late decisions substantial weight is accorded to reconstruction costs as an indication of present fair value.

In defense of this position the commission refers to Missouri vs. Southwestern Bell Telephone Company, decided by the United States Supreme Court May 21, 1923, and Bluefield Water Works vs. Public Service Company of West Virginia, decided June 11, 1923, both yet not reported.

The commission finds that the Pennsylvania Supreme Court has also upheld this position and it quotes from the case of Mercersburg, Lehmasters & Markes Electric Company vs. the Public Service Commission (76 Pa. Sup. Ct., 58), including the following paragraph:

> When the Commonwealth, or the duly authorized donee of its power of eminent domain, actually takes over or injures or destroys private property because of public necessity, the measure of damages of the owner of the property is obtained by well-established rules. Among the items of evidence, relevant and useful to enable a jury to measure those damages, it has not been considered that the original cost of the property to the owner could or should be considered of much if of any importance. A man may acquire property by inheritance or by gift, so that it cost him nothing. That fact can scarcely be considered relevant in a proceeding to ascertain its value at the time it was taken, injured or destroyed. So when the Commonwealth, acting through its agent, the Public Service Commission, undertakes to fix a value upon private property for the purpose of ascertaining its just rental or usable value, it seems to us to be plain that too much consideration of the element of original cost is just as likely to mislead an administrative tribunal as a jury.

CUMULATIVE INVESTMENT CONSIDERED

The city engineers presented data on costs under headings "Original Cost," "Historical Cost" and "Cumulative Investment." As to the first two, the commission declares no extended comment is necessary. Despite the diligence and skill used in compiling these estimates, it was admitted by the experts who presented them that it had been found largely impossible to locate accurate or complete data as to the actual cost of constructing a large part of the property now operated by the company, so that these figures were largely in the nature of estimates of past conditions.

In the third retrospective study, entitled "Cumulative Investment," the engineers compiled data of the money which had flowed into the property by way of capital expenditure through the sale of bonds and from the amount paid in upon capital stock, reaching a total at the time of the argument of slightly more than $131,000,000. While this figure, in the opinion of the commission, doubtless is not mathematically accurate, it does not contain such degree or risk of error when considered as the value of the property as the figures purporting to represent historical or original cost.

At the same time the commission points out that the sale of stock and bonds does not by any means constitute the only sources from which property is built up, as it does not include capital expenditures made out of net earnings. The books of the company and its lessees show a total invested surplus of over $11,000,000, and there may have been additional amounts made in the days when corporate accounting was not an exact science. This basis also does not take into cognizance many intangible items of value, including "going concern value," which is inherent in consolidated and organized properties and which must be given due consideration by a tribunal passing on fair value.

PRINCIPAL ITEMS IN DISPUTE ON BASIS OF PRESENT COST OF REPRODUCTION

The commission then points out that on a basis of present cost of reproduction the city and the company generally agree in the matter of quantities and unit prices, but there is a difference in position as to the right of the company to include certain items and the basis of estimating others. The principal disputed items are four in number, comprising "paving," "interest during construction," "loss of interest in early years" and "cost of financing." There is also the matter of going concern value. These items are considered by the commission as follows:

Paving.—As a condition of the franchises, the company or its predecessors was required to pave from curb to curb the city streets occupied by its lines. In its historical studies the city determined to its own satisfaction that the actual cost of this paving was in excess of $14,000,000. The company claimed for this item of paving nearly $26,000,000, basing its claim upon its estimate of what it would cost at present prices to pay for the present paving upon the streets originally paved by it. In this matter the commission declares the position of the company to be an extreme one, believing that while the enhancement over the original cost of the company's property must be protected, the commission cannot accept the same rule as applied to property in which the company has no useful ownership. In such cases all that the company can claim to have protected is the original investment or price paid for the franchise.

Interest During Construction.—The difference between the company and the city on this item is $6,000,000. The company's estimate is based upon a classification of the property into several groups, assigning to each group a construction period and computing interest on the full cost of each group at the rate of 8 per cent for half the period of construction in each case. The result is a figure for interest during construction amounting to 11.9 per cent of all accounts other than the cost of financing, working capital, development cost and going concern cost. The city's engineer simply submitted an estimate of 10 per cent on the cost of physical items as the probable amount of interest. The commission says it is compelled by the record to give the greater weight to the company's estimate.

Loss of Interest During Early Years.—This item, which represents the "lag" in the development of patronage and earning power, is placed by the company at the equivalent of one full year's interest at 8 per cent, to wit, $15,000,000. It is entirely ignored by the city. The company relies in support of its claims not only on engineering testimony as to probable loss of interest in the early years of the street railway, but also because a constitutional amendment passed in 1915 and dealing with the construction of transit facilities in Philadelphia authorizes the city to capitalize not only the actual cost of construction and interest during the construction period, but also of interest "until the expiration of said period of one year after the completion of said work." The principle was also accepted by the engineering board in the Pittsburgh valuation case. It is approved by the commission, except to say that it is inclined to restrict the interest rate to 7 per cent, and that as the item is really one of the elements of what is commonly termed "going concern value" it must not be duplicated when that question is considered.

Cost of Financing.—The company's estimate of this item was 10 per cent of the entire reproduction costs, exclusive of going concern value. The city's estimate was 5 per cent of reproduction costs. The commission approved 7½ per cent, based on a previous finding, approved by the Superior Court of Pennsylvania in the Ohio Valley Water Company's valuation.

The commission then points out that in view of the discussion on these four disputed items, the city's admitted figure of reproduction costs of $187,000,000 must be very materially increased, certainly to a point substantially upward of $200,000,000.

It then goes on to consider the question of (1) accrued depreciation, which the city claims should be deducted, and (2) going concern value, which the company claims should be added.

ACCRUED DEPRECIATION

On the matter of accrued depreciation, the city offered no proof that the property is not being currently maintained at a high standard of operating efficiency. On the contrary, as the commission points out later, the city's contention is that too great a portion of the company's revenue is being devoted to this purpose. Hence the commission took up the subject of whether an operating company's property, in a high state of maintenance and efficiency for operation, should be depreciated for rate-making purposes because various physical items which go to make up the property are necessarily in various periods of their service life, although retaining to a full degree their original usefulness. On this point it says:

> With regard to physical items of property not subject to repair and renewal, such as water pipe buried in the ground and with an assumed service life of a certain number of years, there would necessarily have to be applied depreciation in reaching its current value, which in a well-managed property would be offset by a renewal or reserve account set up to take care of the situation. But where composite property is being properly maintained and renewed, so as to be kept at all times in a high state of maintenance, a different question arises. No property can be born overnight, and in a system such as this one, which it would take many years to reproduce, we cannot fairly say on the first day of operation that the property must be drastically depreciated when we ascertain its fair value.

After quoting various Pennsylvania cases applying both small and considerable percentages of depreciation, the commission says that it might be well to consider accrued depreciation and going concern value together, as each is intangible in its nature and difficult of accurate ascertainment. The Pennsylvania courts have made allowances for going value, and as the commission declares that in the present case the evidence establishes a minimum of depreciation and a maximum of going value, the latter substantially offsets the former in any adjustment of figures obtained by physical valuation, so that the net result would be to increase rather than to diminish the physical valuation figure. For this reason, as the commission was not attempting to find the exact value, it did not pursue its discussion further.

OPERATING EXPENSES

These also were considered because they gave an index of proper net return. The company submitted a budget for 1923, showing operating revenue $44,736,000, operating expenses $30,868,000, taxes $2,818,000, operating income $11,050,000. To this budget the city offered but two criticisms. The first was by the city engineer in which he claimed that in a period of decreasing cost the allowance for maintenance was $2,500,000 too high, but as there is no indication yet of decreasing costs, the commission found nothing on the record to show that the allowance claimed by the company was excessive. Nevertheless if the company's figure was accepted the commission would expect it to provide a high and strict standard of maintenance.

The other objection raised by the city to the budget was that two items of taxes should be eliminated. The first was the amount paid upon property, the fee ownership of which is in lessor companies, but the commission did not see that the existence of the amount of the taxes was affected by the identity of the owner of the property. The other question was in regard to the federal income tax, which the Pennsylvania commission has uniformly excluded from operating costs. In the light of the U. S. Supreme Court decision in Galveston Electric Company vs. City of Galveston (258 U. S. 388, 399), the commission feels now that it is better advised, but adds that the inclusion of these taxes will make no difference in the final result, as the allowable revenue under any valuation set up would be in excess of the amount produced by the present rate of fare. Possibly a different question would arise with respect to the same taxes levied upon the income of the lessor companies, which the lessee undertakes to pay as part of the consideration for the use of the property, but as this would not affect the question at issue, this question was not pursued further.

OTHER METHODS OF JUDGING REASONABLENESS OF RATES

Finally the commission applied other bases to determine the reasonableness of the rates charged in Philadelphia. It found on comparison of Philadelphia with Boston, Cleveland, Detroit, Chicago, St. Louis, Kansas City and Pittsburgh that the service in Philadelphia was faster, more direct and more frequent than in the majority of the other cities, and the present rate of fare was 6.6 cents per revenue passenger, as compared with 7.9 cents in the average of the cities cited. Tested by this standard the rate is not unreasonable or excessive.

It also applied the index figure of the United States Department of Labor for "all commodities" for April, 1923, or "159," to the 5-cent base fare prevailing throughout American cities in 1913, showing that a fare of 7.97 cents would be necessary today in order to equal the purchasing power of 5 cents in 1913. It points out that it is interesting to observe that 7.9 cents is exactly the average fare in the seven cities cited for comparison, although but 6.6 cents is now realized in Philadelphia.

NEED OF INCREASED SERVICE

Finally the commission says that perhaps the most important single consideration which it is its duty to weigh in the determination of reasonable rates is the paramount public need of increasing and improving service. At one time there was criticism of the retrenchment policy of the Philadelphia Rapid Transit Company, and for the ten years preceding the inauguration of the case there was little evidence of any tendency toward expansion. There has been a marked change, however, since the establishment of the higher fare, indicated not only in an expansion and improvement of its existing property but in taking over the city built elevated railway to Frankford, involving an operating loss. This the company would have been financially unable to do had it not enjoyed the revenue produced by the present fares. Similarly the company has arranged for the purchase of more than 500 new passenger cars and is planning expansion by additional street railway lines, buses and trackless trolleys. Finally, the city is considering the expenditure of more than $100,000,000 for further high-speed lines and is negotiating with the company to find a basis under which it will undertake the operation of the lines. For these reasons, and wishing, within the limits of its power, to give the city of Philadelphia the best transportation facilities in the country, the commission would be reluctant to make any order that would impair the financial strength of the company upon which devolves so great a portion of this task, unless impelled thereto by the paramount interest and rights of the car rider. Indeed this policy is urged by one of the provisions of the public service commission law, which gives to every public service company the right:

"To participate, to such an extent as may be permitted by the commission, and deemed by the commission wise, for the purpose of encouraging economies, efficiencies or improvements in methods of service, in the additional profits which will be afforded by such economies, efficiencies, or improvements in methods of service."

Such economies and efficiencies, the commission thinks, have been carried out by the company, notably in its plan of co-operation between men and management and in accident prevention work.

Definition of Duties an Essential to Organization

Power and Equipment Division of Connecticut Company Has a Plan that Insures Each Man Knowing Just What He Is Expected to Do

THE Connecticut Company, the headquarters of which are in New Haven, operates city and interurban properties which are scattered over a large area. Together they comprise twelve divisions. Each division is operated with considerable autonomy, but the general departments function for the company as a whole, with subdivisions to correspond to each of the operating divisions.

The power and equipment division operates the company's power house, substations, distribution, shops and carhouses. It is under the charge of P. W. Ripple, who has the title of chief engineer power and equipment. Mr. Ripple has studied the organization of his department with a view to the elimination of lost motion, and as an engineer has found exact definition and the graphical presentation of facts and figures most helpful.

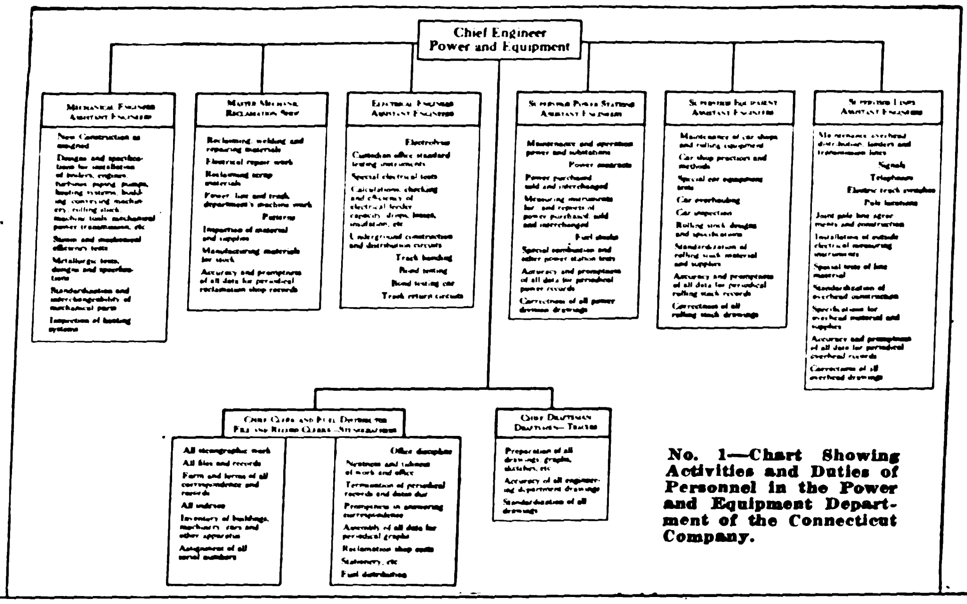
To assist in this work the department has drafted a series of charts covering the functions or duties of the various departments and the heads of these departments. By having these duties carefully defined, the members of the power and equipment staff know just what they are responsible for and they avoid duplication of effort. The purpose of this article is to describe the organization and the organization charts of the department. These are illustrated on the following page. Other data and charts of this department will be made the subject of a subsequent article.

The first chart shows the eight department heads who report to the chief engineer of the power and equipment department, with the duties of these eight departments. In addition to this chart, which applies to the department as a whole, detail charts have been prepared for each of the sub-departments or organization divisions.

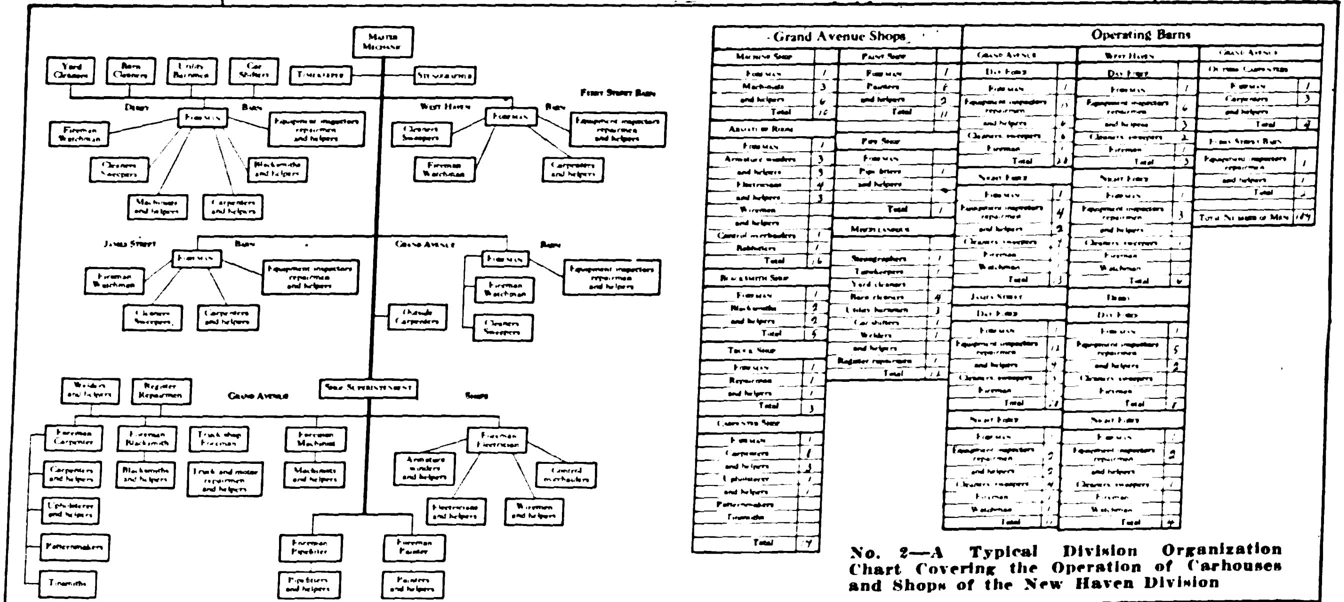
Thus, the second illustration shows the chart for the operating barns and shops of the New Haven division, with the master mechanic of that division at the top. Under the present organization of the company, the master mechanic of each division reports on engineering and mechanical subjects to the chief engineer and on operating matters to the division superintendent and through him to the general manager. It will be noticed that this chart, like the others, showing the organization of a division, carries a list of the number of employees in the division, but the chart is so arranged that these numbers are put in by ink so that no change in the drawing is required to bring it up to date when there is a change in the number of men employed in any division. The number of employees given in the reproduction of this and subsequent charts is of course simply the number at the time that the chart was obtained from the company.

As will be seen, in the New Haven division there are five carhouses or "barns" with one shop, the latter in charge of a shop superintendent. There are similar charts for the other divisions.

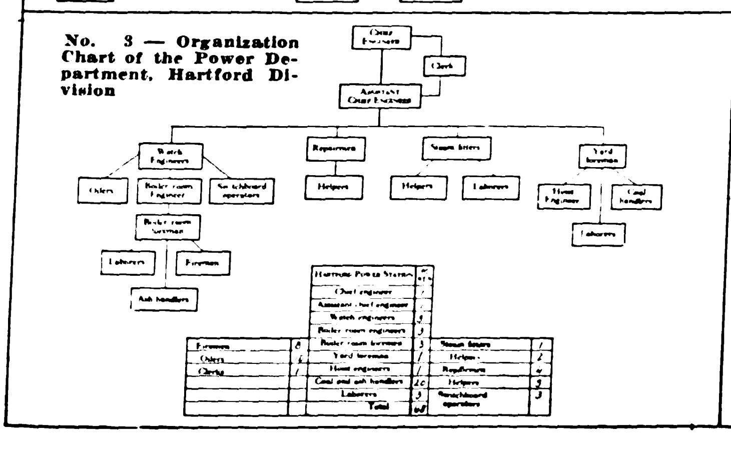
Typical power stations and line department charts are shown in the third and fourth illustrations. The former is for the Hartford division and the latter is for the Bridgeport division.



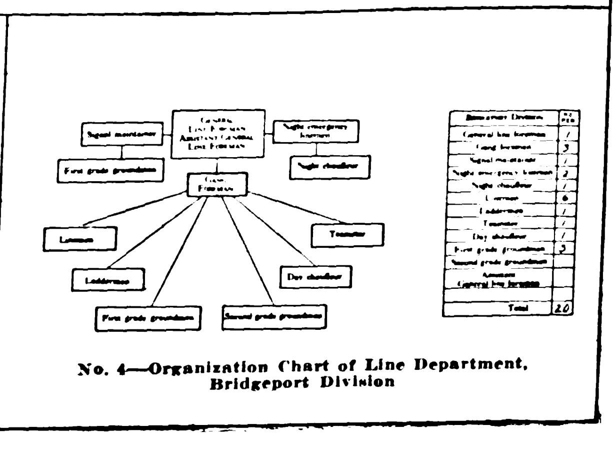
No. 1—Chart Showing Activities and Duties of Personnel in the Power and Equipment Department of the Connecticut Company.



No. 2—A Typical Division Organization Chart Covering the Operation of Carhouses and Shops of the New Haven Division



No. 3 — Organization Chart of the Power Department, Hartford Division



No. 4—Organization Chart of Line Department, Bridgeport Division

Association News & Discussions

Canadians Discuss Operating Problems

Four-Day Convention of Canadian Electric Railway Association at Toronto Considers Traffic Studies and Motor Performance—Valuation, Standardization and Public Relations Are Discussed—Social Features Assist Greatly in Making a Successful Gathering

THE nineteenth annual convention of the Canadian Electric Railway Association was held June 27 to 30 in the Music Building of the Canadian National Exposition at Toronto, Ont. The convention, which was one of the most successful in the history of the association, was attended by between 200 and 300 members and guests. In the absence of the president, Major F. D. Burpee of Ottawa, the meetings were presided over by H. H. Couzens, vice-president, and he also was toastmaster at the annual banquet Thursday evening. The manufacturers' exhibit, a feature which was inaugurated last year for the first time, was continued this year and proved one of the features of the convention.

Technical sessions were held each morning. On Wednesday the subject matter was confined to a meeting of the executive committee, followed by the presentation of the secretary's and treasurer's reports. The Thursday morning session was confined to a paper by Alexander Jackson, superintendent of time-tables Public Service Railway (N. J.), on "The Operation of a Scientific Survey of Traffic Movements on Urban Railways," abstracted elsewhere in this issue. At Friday's session, W. G. Gordon, railway and traction engineer Canadian General Electric Company, presented a paper entitled "Deciding on the Proper Motor for a Given Cycle of Duty," which will be printed in a later issue. Saturday's session was confined to the presentation of the report of the committee on "valuation, maintenance and depreciation of street railway assets," and the election of officers for the coming year.

A luncheon was given each day at Sunnyside Pavilion, some distance from the convention hall. The members were transported to and from the pavilion through the courtesy of the Toronto Transportation Commission and the White Motor Company. The Transportation Commission furnished two double-deck buses which were taken from service in Toronto and reserved for the use of members and guests. These were augmented by a demonstration bus provided by the White Motor Company.

At the luncheon on Wednesday the report of President Burpee was read in his absence by Mr. Couzens. It was stated that according to the last published government reports the Canadian electric railway industry operates between 5,000 and 6,000 cars on nearly 2,500 miles of track, and the total investment reaches into hundreds of millions of dollars. "During the past decade in Canada there has been a pronounced movement toward public ownership of electric railways," the report stated. "I am glad that our association is big enough and broad enough to include all the electric railways of Canada and that quite a number of the publicly-owned railways have become members. The Toronto Transportation Commission, which, under the management of the vice-president of the association, controls one of the largest Canadian systems, is giving a splendid example of what can be done under public ownership and is rapidly producing here one of the model traction systems on the North American continent."

The luncheon on Thursday was featured by an address of welcome, on behalf of the Mayor of Toronto, by Controller Hiltz. The feature at Friday's luncheon was an address by Sir John Gibson, who recounted some of his early adventures in the development of hydro-electric power in Ontario.

A spirit of optimism pervaded the annual banquet on Thursday evening. After the conventional toast to the King, proposed by Vice-President Couzens, and which was followed by the national anthem, a program of toasts and vocal selections was begun which lasted on toward midnight. In responding to the toast "Canada," proposed by Lt.-Col. G. C. Royce, George Wright of the Toronto Transportation Commission outlined the country's possibilities, the responsibilities of its people and the conditions handed down to them by their ancestors, which he felt should be their guide in meeting their problems. Canada, he declared, is the white man's last prospect. The immigration policy should be such as to keep it a white man's country. Mr. Wright briefly reviewed the potential wealth of the country and stated that he regarded Canada's future to be industrial rather than agricultural.

In proposing the toast to "Our Industry," G. Gordon Gale declared that electric transportation has become the backbone of the community life of cities. C. B. King, London, Ontario, in response, spoke of the development of the electric railway and some of the problems which must be faced by those in charge.

F. A. Gaby, Toronto, proposed the toast "Our Guests," to which response was made by Morris Buck, associate editor ELECTRIC RAILWAY JOURNAL. "The Ladies" was proposed by Hugh Millar, and responded to by Don M. Campbell, Preston. "The Technical Press" was proposed by E. P. Coleman, Hamilton, who paid tribute to Acton Burrows, editor *Canadian Railway and Marine World*. The latter in his response wittily replied, explaining briefly the purpose and work of the technical press.

ENTERTAINMENT FEATURES

Numerous features were provided for the entertainment of the ladies. The trip about the harbor which had been scheduled for Thursday afternoon was cancelled on account of rain, but a visit to the Royal Canadian Yacht Club was made instead, tea being served on the club verandas. On Friday the ladies had a motor trip about the city, with a tea at the Old Mill on the Humber River.

A baseball game was played between the company representatives and the manufacturers, which was called on account of darkness and inability of the players to continue, the final score being Members 7, Manufacturers 3. A dance was held Friday evening at the King Edward Hotel, and it was in every sense an enjoyable affair.

OFFICERS ELECTED

At the Saturday morning session, the report of the nominating committee was received and accepted, the following officers being elected for the ensuing year:

Honorary President, Sir John M. Gibson.

Honorary Vice-President, Acton Burrows.

Honorary Counsel, T. Ahearn, Ottawa; George Kidd, Vancouver; Col. J. E. Hutcheson, Montreal; F. A. Gaby, Toronto.

The active officers are:

President, H. H. Couzens, general manager Toronto Transportation Commission.

Vice-President, D. E. Blair, Montreal.

Treasurer, E. P. Coleman, Hamilton.

Auditor, Lt.-Col. G. C. Royce, Toronto.

The executive committee consists of the president, the vice-president, the immediate past-president (F. D. Burpee, Ottawa), and the following: C. L. Wilson, Toronto; W. S. Hart, Quebec; H. E. Weyman, Levis; G. Gordon Gale, Hull; C. B. King, London; M. W. Kirkwood, Galt; A. W. McLimont, Winnipeg; D. W. Houston, Regina; H. K. McLean, St. John, N. B.; W. R. Robertson, Toronto.

Don M. Campbell, representing the manufacturer members, recommended that the next annual meeting of the association be held in Ottawa. The manufacturers also recommended that a permanent secretary be appointed, who would devote at least one-half of the year to association duties, and the other half to attend state conventions, getting such ideas from them as he could. G. Gordon Gale recommended that it would be better to have a combined convention with the other electrical associations. This would give the manufacturers a chance to prepare better exhibits, which would be available to the members of all such associations. It was decided that steps should be taken to see what possibilities exist for co-operation between the different associations leading to a joint convention. On this account no decision was made as to the place for the next convention.

TIMELY TOPICS

Prior to the convention a leaflet was circulated among the members containing a number of questions on points connected with transportation and maintenance problems. The time available was so short that only a small amount of discussion was possible. On the question of the advisability of redipping old armatures in dipping varnish, Mr. Robertson said that this is a questionable value, because the maintenance cost of old motors is so high. He said that a careful study frequently will show that it would pay better to scrap the old equipment and buy new on account of the lower maintenance cost and the smaller number of failures. Different methods for dipping armatures were described by Messrs. Weyman, Royce and Blair.

It was decided that the questions listed in the "Timely Topics" should be sent out to the members in the form of a questionnaire, and then should be returned by mail to the secretary.

DISCUSSION ON TECHNICAL PAPERS

The discussion on Mr. Jackson's paper was led by N. D. Wilson, engineer on traffic studies of the Toronto Transportation Commission. He agreed with all the main points in the paper, stating that he takes his facts into account and draws his graphs in much the same manner. He illustrated his discussion with some of his charts, pointing out the differences between his method and that of Mr. Jackson, which he stated did not affect the general value of the information. In Toronto, two independent departments make traffic counts. The traffic department takes its counts at the controlling points, where the loads are maximum, making a check on each main route every two weeks and on each minor route every month. The traffic study department handles the outlying areas, making special counts looking toward the end of determining the direction of growth and possible changes in routing. It was pointed out that the graphs do not show where routes should be short-lined. It is Mr. Wilson's impression that this information can be obtained only by personal canvasses.

Mr. Robertson, general superintendent of the Hydro-Electric Railways, stated that on small lines traffic checks are not of such great value as on city systems. He suggested that headway recorders are of great value in checking up schedules on the street.

Mr. Wilson stated that in Toronto the checks are made by two men assigned to each street corner, one man at a time being on from 6 a.m. to midnight. These checkers estimate the passengers as the cars go by. On heavy corners one man can get data for one direction only, taking the time, the car number, the route number, the destination and the number of passengers on board. The field data are totaled in the office by fifteen-minute or half-hour periods. Particular attention is paid to the car number, to get the seating capacity, from which the overload on each car can be determined. Short-lining is not determined from these counts, but riding counts are made by observers stationed on the cars, to determine the number of passengers getting on or off at each stop.

Mr. Couzens stated that Mr. Jackson's paper covered all the principal points in traffic checking, being remarkably complete. He brought out the point that traffic checking paid for itself. One value of the checks is the exploding of various ideas, not only those of citizens but also in other departments of the railway. The checks show at a glance the whole situation, and this information assists greatly in silencing complaints. He does not think that trainmen can get the information to compare with that which can be obtained by a traffic checking department. He states that saving one car on the base schedule is worth some $15,000 to $20,000 a year, which probably will be equal to all the cost of checking traffic for this period.

In summing up the discussion, Mr. Jackson stated that considerable amounts of money are spent by companies to tell where and when the cars should be placed for the public's benefit. He pointed out that it is equally necessary to follow this work up and see that the schedules are actually carried out on the streets.

STANDARDS COMMITTEE

The report of the standards committee, G. Gordon Gale chairman, states:

About six years ago the Canadian Engineering Standards Committee (now Association) was formed in Canada, and following this the American Engineering Standards Committee was organized by the national associations of the United States. The newly formed standards committee of this association has found it desirable to follow the practice of the standards committee of the A.E.R.A. In this committee, the C.E.R.A. now has an official medium of co-operation with the standards committee of the A.E.R.A., and with the Canadian Engineering Standards Association.

The secretary of the C.E.S.A. has called upon this committee for representation on sectional committees engaged in drafting standard specifications on the following: Wire strand; signals on highways; overhead crossings. These projects are in various stages of completion.

PUBLIC RELATIONS COMMITTEE

The committee on public relations, A. W. McLimont, Winnipeg, chairman, reported that its work during the past twelve months has been largely confined to interchange of opinions among the various members. Local conditions must be the governing factor in all public relations work. There are well established and well defined policies for the advancement of good public relations, such as frank and open policy in dealing with the public; proper publicity, backed up by a performance of good service; investing the railway with a personality which makes itself felt in all movements for the public good; systematic and continuous education of employees.

The individual opinions of certain members of the committee, while it is stated that they are not necessarily shared by all, are included. George Kidd, Vancouver, stated: "Where cities are served by private companies, and such cities have grown to a size where they consider the ownership of their own utilities desirable, that the public should be educated to treat the existing company, which has done the pioneer work, fairly, and should buy it out, rather than enter into a campaign of competition, which would be injurious alike to the public and the shareholders. In other words, these companies are not prepared to enter into competition with municipalities, for, as you are aware, such competition is extremely unfair."

W. J. Lynch, Quebec, stated: "It is my opinion that a blanket policy of advertising as regards public relations cannot advantageously be adopted. Moreover, I have found that there is a great deal to be derived from 'leaving well enough alone.' It is my opinion that unless a public utility company has some request to make of some regulatory body and its operations are running along smoothly, it is better to refrain from any policy of publicity, it being most important that public utility officials do their utmost to prevent occurrences that irritate the public, and further, to do all that is possible to promote public relations and good will."

DEPRECIATION AND CLASSIFICATION OF ACCOUNTS

A special committee was appointed at last year's meeting to consider and report on questions of valuation, maintenance, depreciation and classification of accounts. This committee, H. E.

Weyman, Levis, chairman, reported that it had confined its work to the last two of these topics. At present there are numerous classifications in use in Canada, both by regulatory bodies and the electric railway industry. This necessitates more or less extra work beyond what would be required if a uniform classification were in force. There are two recognized classifications, the Interstate Commerce Commission classification and that of the Canadian Minister of Railways. The committee recommends a uniform Canadian classification to be recognized and adopted by the industry and public regulatory bodies, in which provision should be made for all of the standard accounts, with such modifications as are necessary to cover Canadian conditions. It is also recommended that the Canadian regulatory bodies be requested to permit the industry to make the returns for the calendar year.

In the portion of the report on depreciation, the fundamentals of the subject are reviewed, followed by an outline of the I.C.C. classification rules. It is stated that considerable confusion exists between such items as "repairs," "renewals," "depreciation," "replacements," "deferred maintenance," "reconstruction," "accrued maintenance" and "accrued depreciation." It is recommended that a definite distinction should be made and adopted between maintenance and depreciation, as different commissions and classifications give different rules. The committee submits for consideration that depreciation, in relation to the electric railway, is not necessarily a loss in value; it is purely an operating expense. The definition of the term "depreciation" should be clearly stated and agreed upon by all regulatory bodies and the industry at large. Distinction should be made and agreed upon by all interested parties between ordinary maintenance and renewals and replacements (depreciation). Obsolescence is considered to be an expense chargeable to future income.

The discussion was led by Mr. Couzens, who considered depreciation especially in connection with publicly owned enterprises. Obsolescence he holds to be a different item from depreciation. The problem in that case is whether the economy to be obtained from the replacements of antiquated parts will pay in, say, five years for the expenditures to be made for the new parts. If it cannot be paid for from savings in that length of time, it is very questionable whether an existing part should be retired and replaced. There is a problem in connection with the depreciation problem, depending on whether the amount charged to it is to be invested in securities or reinvested in your own enterprise, thus reducing the amount of capital which must be raised. He pointed out that putting the money raised from the depreciation account in a trust fund will bring only a relatively low rate of interest, which is in practically every case less than can be earned by putting the money back into the property. In case the latter is done, he thinks the depreciation fund should be credited with the interest earned on the new investment.

Mr. Robertson, in commenting on the fact that the land values should not be depreciated, raised the question of whether advantage should be taken of appreciation of land values.

Mr. Couzens pointed out that where new capital has to be raised for an enterprise there is always present the question of whether the securities issued should be sinking fund debentures or serial debentures. He prefers the serial type, because then the principal is being retired and advantage taken of reducing the amount of interest which must be paid, in a manner similar to the reduction of interest by putting money back into the property. In this way, he gets rid of capital bearing a high interest rate, whereas the sinking fund usually brings only a low rate of interest.

EXHIBITS

A very attractive display of electric railway material was presented by the exhibitors. Among the principal exhibitors were Allen General Supplies, Ltd., Toronto; Don M. Campbell, Ltd., Preston, Ont.; Canadian Car and Foundry Company, Montreal, Que.; Canadian-Cleveland Fare-Box Company, Preston, Ont.; Canadian General Electric Company, Ltd., Toronto, Ont.; Canadian National Safety League, Toronto, Ont.; *Canadian Railway and Marine World*, Toronto; Canadian Steel Foundries, Ltd., Montreal; Canadian Westinghouse Company, Ltd., Hamilton, Ont.; C. E. A. Carr Company, Toronto; Differential Steel Car Company, Findlay, Ohio; Dominion Wheel and Foundries Company, Ltd., Toronto; *Electrical News*, Toronto; ELECTRIC RAILWAY JOURNAL, New York; *Electric Traction*, Chicago, Ill.; English Electric Company of Canada, Ltd., St. Catharines, Ont.; Ferranti Meter and Transformer Manufacturing Company, Toronto; Lyman Tube and Supply Company, Ltd., Montreal; Nachod Signal Company, Inc., Louisville, Ky.; Metal and Thermit Corporation, Toronto; Ohio Brass Company, Toronto; Railway and Power Engineering Corporation, Ltd., Toronto; Sarnia Bridge Company, Sarnia, Ont.; Southam Press, Ltd., Montreal; United States Steel Products Company, Toronto; Witherow Steel Company, Pittsburgh, Pa.; White Motor Bus Company, Toronto.

A Traffic Survey for Urban Railways*

BY ALEXANDER JACKSON
Superintendent of Time-Tables, Public Service Railway, Newark, N. J.

THE frequency of car service should be determined by the riding habits of the patrons along the route, first consideration being given to lines of heavy travel, thereby accommodating the largest number. It should be borne in mind that the riding habit of patrons along a line of light travel can be discouraged by curtailing the service and thus causing long waits between cars. Close observation must be made to keep in touch with and to meet every changing riding condition and the car service arranged accordingly. In many cases the members of the operating department can obtain information in advance that will enable them to anticipate some of the changes and have the car service lined up ready for the change.

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*Abstract of a paper presented at the convention of the Canadian Electric Railway Association, Toronto, Ont., June 28, 1923.

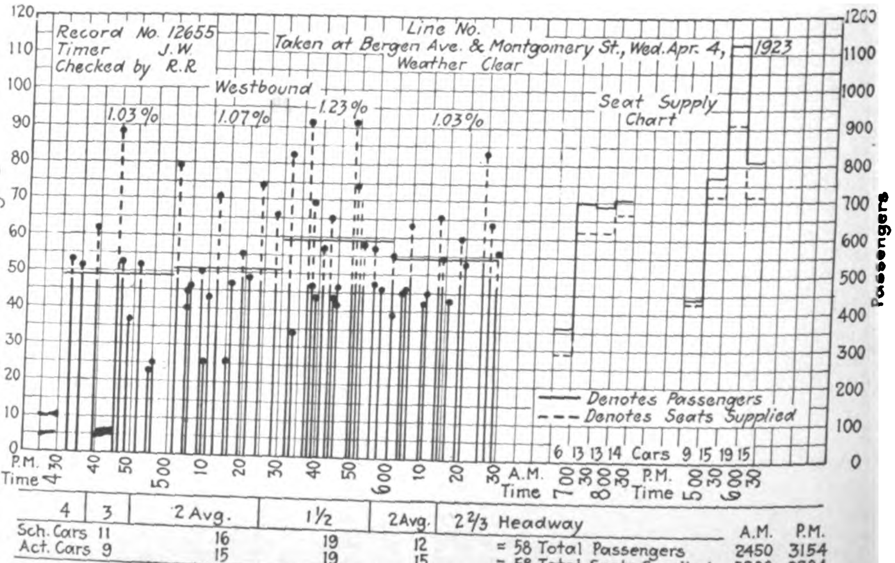


Fig. 1—Portion of Typical Traffic Chart

I will give you a description of the methods employed by one of the large railway companies for taking, recording and filing its traffic records. The traffic department is in charge of a traffic engineer who employs about twenty traffic checkers. These men are assigned to designated points on the line to be checked. The locations chosen are at points of maximum load. To enable the checker to count the number of passengers on the car while it is standing, the points chosen are usually at streets where a compulsory stop is made. The men are furnished with slips showing the seating capacity of each type of car in service. They record on a standard printed form the car or the train number, the time and the number of passengers on each car as it arrives, or if the location is where a heavy pick-up is made the leaving load is recorded. By furnishing the checkers with slips, showing the seating capacity, they are enabled to make a fairly accurate count during the rush hours on a line operating a short headway, by simply counting the number of passengers who are standing and then adding to this number the seating capacity.

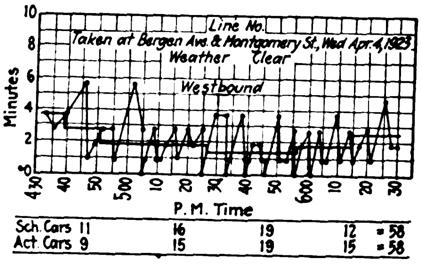


Fig. 2—Chart Showing Deviations in Running Time

This company endeavors to make a check during the rush hours morning and night on the heavy trunk lines once a week and on other lines once every two weeks. More seats being supplied than passengers carried during the non-rush hours, the off peak period being almost constant, all-day records of eighteen hours are only made periodically on week days, but quite frequently on Saturdays and Sundays, especially during the summer months, or during the transitory periods, when these checks are necessary for the rearrangement of time-tables to take care of the park and summer resort travel. Other points at which passenger counts are taken are intersections with other lines and at transfer points, also at the point of divergence when two or more lines run jointly over the same track. This location also applies to a line with several terminals.

THE TRAFFIC CHART

After completing their check on the street the checkers come into the office and make graphic charts of their work. A specimen chart, Fig. 1, shows the line and location where the record was taken, together with the weather conditions. The checker spots the car on this form according to the time and the number of passengers. For example, if a car arrives at 7 a.m. with sixty-five passengers a spot is made on the line opposite 65 and on the line directly above 7 a.m. If the car should be one of the type seating forty-eight passengers a solid line is drawn from zero to 48 with a broken line to 65, showing seventeen passengers standing. The average number of passengers per car is shown by a horizontal line opposite the number of passengers for each half-hour period.

Along the base of the chart, directly under the time, is shown the scheduled headway, the number of cars called for on the time-table to pass in each half hour period, and the actual number passing. These charts, when completed, will show at a glance each and every car, its time of arrival, seating capacity and the number of passengers it carried. Any break in the headway or interval between cars or bunching will stand out prominently. To the right is shown the total number of seats supplied and passengers carried in each half hour period.

RUNNING TIME CHECK

This is another form developed from the checkers' traffic data. The chart, Fig. 2, is made up in the same manner as the traffic check except that headway in minutes is shown on the left in place of passengers. The headway that is scheduled to pass the point where the checker is stationed is shown by a horizontal line drawn opposite the minutes. All cars on scheduled headway show on the line, those on shorter headway below, and those with a longer headway above the line. All bunching of cars will also show below the line.

Another form of traffic study developed showing where business originates and where distributed is known as the distribution chart, Fig. 3. To procure the data required two observers are placed on a car, one at the front platform and the other at the rear platform. At each stop throughout the trip each observer records the street, time and the number of passengers boarding or leaving the car. One of these observers with a stop watch records the length of each stop in seconds. From this data each trip is charted. The length of trip in miles is shown on the horizontal scale, the passengers boarding and leaving being shown in vertical scale. Those boarding are shown above the base line and those leaving below the line. The num-

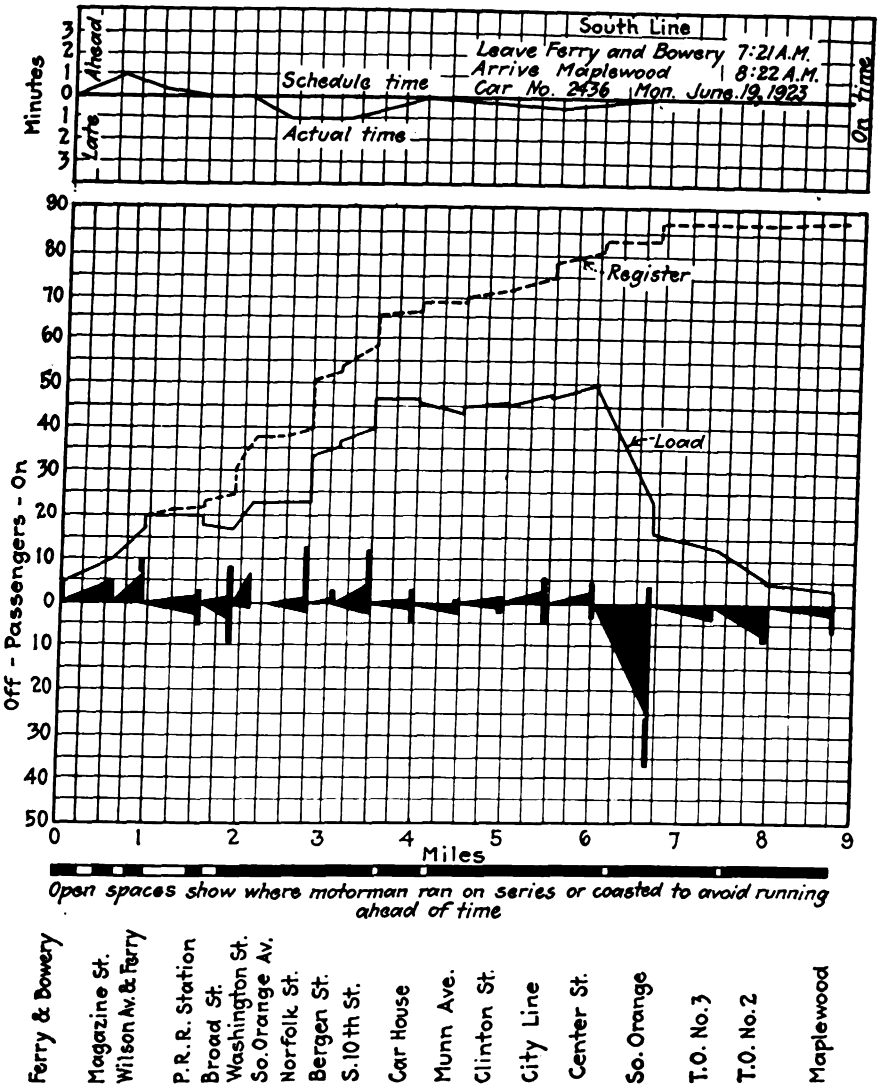


Fig. 3—Distribution Chart Showing Boarding and Leaving Points

ber of passengers on the car at each point is obtained by taking the continuous algebraic sum of the ons and offs, and connecting the points thus obtained.

A line should be drawn through the chart showing the seating capacity. Those above the line being standing passengers, this will show the distance and length of time passengers were compelled to stand on each trip recorded. From this chart a study can be made of the possibilities of establishing a short line service, thereby obtaining the maximum use of equipment at minimum cost, as the data will enable you to make a close estimate of the amount of business picked up and discharged at each stopping point on the route, together with the location and duration of your maximum load. By obtaining the area of the close curve formed by the load line the passenger miles for the trip is given, which divided by the total passengers carried will give the average ride per passenger.

The question regarding the looping or turning of cars in the congested district is one that cannot be settled without a complete study of existing conditions; while through routing could be worked to advantage in some localities it would not accomplish the best results in others. This study can also be made from the distribution chart.

The running time points on each line should be checked up at frequent intervals and the trainmen impressed with the importance of getting their cars over the line as called for by the time table. Intermediate time points should be of five minutes or less. All transfer points, intersections, railroad stations or principal locations on the line should be established time points. Check should also be made periodically of how cars are leaving the car house on the pull-out trips, commencing the day's work. Many of the irregularities in headway during the rush hours are traceable to a crew pulling out late. Another condition causing bad headways is created by one crew leaving a terminal a minute ahead of time while the following crew leaves a minute late. This is a condition created by lack of supervision which should be corrected as soon as discovered and action taken that will cause the trainmen to be particular in the strict observance of schedule.

Delays caused by congestion in the business district should be analysed and steps taken to get the co-operation of the municipal authorities with a view of reducing them to a minimum by reducing the number of loading and unloading points and establishing trolley station stops. Delays at turnouts on single track lines should be given study. On account of the longer headway of this character of line, riding can be discouraged if the delays are too frequent. Delays at intersections with main lines, transfer points and those at heavy loading points, due to passengers not having exact fare ready and being compelled to get change, should be eliminated or brought down to a minimum. All of these delays have a direct bearing on operating expenses and by making a saving in the time lost at these points and speeding up the operation, a saving in the number of cars required to handle the rush hour can be made, or the cars saved can be added, increasing the service without additional cost.

Central Electric Railway Association Entertainment

THE committee on arrangements of the Central Electric Railway Association, of which S. D. Hutchins, Westinghouse Traction Brake Company, Columbus, Ohio, is chairman, has completed arrangements for the entertainment of delegates to the summer meeting at Cedar Point, Ohio, July 18, 19, 20. The business program was published in these columns last week.

On Wednesday forenoon, July 18, there will be cards for the ladies in the lobby of the Breakers Hotel.

Wednesday afternoon, arrangements have been made for a water polo game between teams to be selected. There will be a trip to Put-in-Bay for those who desire to go, leaving Cedar Point on the *S.S. City of Erie* at 12 o'clock, arriving at Put-in-Bay at 1 o'clock and returning at 2:45.

Wednesday evening there will be a dance for convention delegates in the pavilion.

Thursday forenoon, cards again for the ladies.

Thursday afternoon is left open.

Thursday evening there will be a 6 o'clock dinner, for which speakers and entertainers will be provided.

Arrangements have also been made so that delegates may have the privileges of the Plum Brook Golf Club.

President J. P. Barnes is planning to bring the Louisville Railway Quartet as one of the entertainment features.

Bus Law Main Topic of Iowa Convention

Commissioner Indicates that Law Is Approved by the Iowa Railroad Commission—The Pass System and Publicity Are Discussed

THE new motor vehicle law recently passed by the Iowa Legislature was the main topic under discussion at the Iowa Electric Railway Association meeting held at Mason City, Iowa, on June 28, in conjunction with the Iowa Section of the National Electric Light Association. Speaking at the joint session of the two associations, Charles F. Webster, member Iowa Railroad Commission, stated that the new motor vehicle law had the hearty support and approval of the railroad commission. His interpretation of the law indicated that it was not the intention of the Legislature to put the buses out of business, inasmuch as the legislators appreciated the fact that buses have a place in the transportation field. However, the bill was framed in order to protect the rider and to pay for the use of the highway.

Diverging from the subject of motor vehicle law, Mr. Webster spoke briefly on general conditions throughout the country, and in particular, Iowa. He indicated in his address that service as well as rates of fare will determine the condition of the railroads, both steam and electric, and in conclusion urged that there be more business in politics and less politics in business.

A brief outline of the work done by the Iowa Committee on Public Utility Information during the eighteen months of its life was given by Joe Carmichael, director. During this period the committee has won the respect and confidence of the newspaper men throughout the state and has become a consistent advertiser in all the papers of the state. No criticism of any kind has been made by any of the papers. News space was obtained in the eighteen months which if rated at the customary advertising rate would amount to $70.000. An actual expenditure of $20,000 in advertising space had been made. The committee plans to provide speakers to give brief addresses in various communities on public utility activities.

A discussion of recent court and commission decisions concerning "Fair Value, Depreciation and Rate of Return" was given by John A. Reed, Cedar Rapids, Iowa. This discussion is in printed form and may be obtained from the Iowa Committee on Public Utility Information, Des Moines. That the utilities stand on a firm foundation, with the courts serving as a stone wall between them and attacks by politicians, was the concluding opinion of Mr. Reed after discussing a few of the outstanding cases printed in the pamphlet.

Following President H. E. Weeks' address at the afternoon railway men's meeting, C. D. Cass gave a brief discussion of the new motor vehicle regulatory law which has recently been passed by the Legislature. While the bill was not wholly satisfactory to the railway men, he felt that it contained some of the fundamental principles desired. Interpretation of various portions of the law were given by several of the railway men present. The principal provisions of the law are given in the following:

The Iowa bill places intercity motor carriers, hauling either freight or passengers, under the supervision of the State Railroad Commission. Not only will buses and motor trucks be subject to regulation as to rates and charges, but they will be compelled to pay taxes for the upkeep of the roads over which they travel.

The law affects all motor carriers traveling over definite routes hauling either persons or property. It is specifically worded to include gasoline trucks which follow a fixed route but excludes trucks used for carrying farm and dairy produce.

According to the terms of the law the Railroad Commission is authorized to fix rules for the operation of buses for the protection of the public and also to investigate and determine reasonable rates. Before an operator can place a bus or truck in service he must first obtain a certificate for doing business from the Railroad Commission. The bus men succeeded in killing by amendments some of the most drastic features of the bill as originally introduced, but were not strong enough to smother the bill.

In addition to vesting the railroad commission with authority to supervise and regulate motor vehicles not operated wholly within the limits of any city, the law requires them to obtain from it certificates of convenience and necessity. It imposes the following taxes in addition to the regular license fees or taxes imposed on motor vehicles in the state:

Motor vehicles having pneumatic tires, one-eighth cent per ton-mile of travel over and along the public highways.

Motor vehicles having hard or solid tires, one-fourth cent per ton-mile of travel over and along the public highways.

Passenger ton-miles are to be figured by taking the maximum seating capacity of the vehicle, including trailers, at 150 lb. per passenger seat, plus the weight of the vehicle; while freight ton-miles are to be found by taking the maximum freight carrying capacity of the truck plus the weight of the vehicle.

The maximum weights permitted, including the weight of the vehicles, are 16,000 lb. for vehicles with solid rubber tires and 20,000 lb. for vehicles with pneumatic tires.

The taxes collected are to be used in the maintenance and repair of the highways and streets over which the carrier operates. The law provides that the money shall be allocated to the various city and county road districts in the same proportion as the mileage operated is distributed among the districts.

All motor carriers are required to file with the Railroad Commission liability insurance bonds, in form and amount to be determined by the commission, to provide compensation for injuries and damages for which they are liable, and also a bond satisfactory to the commission to guarantee payment of all fees, taxes or charges due to the state and for the faithful performance of the service it undertakes.

The commission is authorized to adopt and enforce such safety rules and regulations as in its judgment may be necessary. The act prescribes that drivers of motor carriers must be more than twenty-one years of age, of good moral character, fully competent to operate a motor car and hold a regular chauffeur's license from the state motor vehicle department. The speed is limited to 25 m.p.h. for passenger vehicles and 20 m.p.h. for freight carriers.

Mr. King, Rock Island, described the monthly identification card as it is used in Mason City and Rock Island. Mr. King presented figures which tended to show that the pass had the result of bringing back the riding habit among the people, it being particularly successful in the Tri-Cities, where the railway system serves 80,000 people in two distinct business districts. On that particular property the average receipts per revenue passenger were a little less than 7 cents. Figures indicated that the pass was used for a little less than two rides per day, which amounted to about fifty-nine rides per month. By way of comparison, in Mason City and Muscatine, cities of 20,000 population, the average receipts per revenue passenger have amounted to 7.5 cents, the average number of rides per passenger per month in Mason City being seventy-seven and in Muscatine, fifty-four. Discussion following Mr. King's talk seemed to indicate that the identification card system will increase riding.

The officers elected for the ensuing year are: F. C. Chambers, president Des Moines City Railway, president; R. A. Leussler, Omaha, Neb., vice-president; and H. E. Weeks, Davenport, Iowa, secretary and treasurer. Announcement was made by John Sutherland that the fall meeting of the Iowa Electric Railway Association will be held Aug. 30 and 31 at Davenport, Iowa.

American Association News

Good Exhibit at Atlantic City Assured

At Its First Meeting to Assign Space, the Exhibit Committee Finds More than 100 Applicants and Applications for 52,000 Square Feet of Space

THERE was a well-attended meeting of the exhibit committee at association headquarters on July 2, when the first allotment of space for exhibits at the Atlantic City convention was made. F. C. J. Dell, director of exhibits, reported that the applications for space already received were 50 per cent greater, both in number and in space desired, than at this time for the last Atlantic City convention in 1922. This assures a successful exhibit. It is believed that the absence of an exhibit feature this year at the N. E. L. A. convention and at the convention of the Mechanical Division, A. R. A., has helped to make this demand for space at the A. E. R. A. convention.

Members of the committee in attendance at the meeting in New York were: L. W. Shugg, chairman; Clinton E. Morgan, vice-chairman; T. W. Casey, George Keegan, J. C. McQuiston, L. H. Palmer, A. M. Robinson, E. P. Waller and J. W. Welsh.

After a discussion on various details of the exhibit, Mr. Shugg, the chairman of the committee, surrendered the chair to Mr. Morgan, vice-chairman, under whose direction actual assignment of space took place. Following is a list of the exhibitors with their space as assigned by the committee:

Firm Name	*Space Numbers*
American Motor Truck Company	300-302
American Abrasive Metals Company	538
American Brake Shoe & Foundry Co.	500
Anaconda Copper Mining Company	525
Bethlehem Steel Company	562 to 567 incl.
Bates Expanded Steel Truss Company	207
The Buda Company	172
The Baldwin Locomotive Works	148-150-152
The J. G. Brill Company	8 B
Bridgeport Brass Company	149
Bethlehem Ship Building Company	568-569
Consolidated Car Fender Company	506
Barron G. Collier, Inc.	606
Chicago Pneumatic Tool Company	101, 103, 105, 107
The Curtain Supply Company	610
Cheatham Electric Switching Device Co.	516
Consolidated Car Heating Company	22
Chillingworth Mfg. Company	503
Carnegie Steel Company	416
Day & Zimmermann	412
The Drew Electric & Mfg. Co.	576-577
Duff Manufacturing Company	571
ELECTRIC RAILWAY JOURNAL	7
Electric Service Supplies Company	414
Economy Electric Devices Company	616
The Ellcon Company	602
Elliott Service Company	559-561
The Electric Railway Improvement Co.	200-C
The O. M. Edwards Company	527-529
Electric Traction	10
Fageol Motors Company	304-306
Foamite-Childs Corporation	521-523
General Electric Company	20-10B-10C
Galena Signal Oil Company	24
Griffin Wheel Company	612
Garford Motor Truck Company	310-312-314
Gold Car Heating & Lighting Co.	579-581
Globe Ticket Company	572-573
Hale and Kilburn Corporation	406-408
Haskelite Manufacturing Company	608
Heywood-Wakefield Company	520-522-524
Hyatt Roller Bearing Company	614
Illinois Steel Company	416
International Steel Tie Company	121, 123, 125
Ingersoll-Rand Company	200B
The Lorain Steel Company	546-547-548-549
Morton Manufacturing Corporation	602
Metal & Thermit Company	13-116-118-120
More-Jones Brass & Metal Company	554-555
McCardell & Co., J. R.	200-D
National Railway Appliance Company	620
National Tube Company	550-552
R. D. Nuttall Company	17
The National Lock Washer Company	541
National Pneumatic Company	12-14-16-18
Nachod Signal Company	512-514
National Brake Company, Inc.	543
Naugle Pole & Tie Company	560
National Carbon Company	604
The Okonite Company	534-536
The Ohio Brass Company	23
Ohmer Fare Register Company	558
The Pantasote Company	400
Pratt & Lambert, Inc.	501
The Rail Joint Company	403
Root Spring Scraper Company	575
Railway Track-work Company	171-173
Rail Welding & Bonding Company	201-205
Reade Manufacturing Company	505-507
Reo Motor Car Company	124 to 136 incl.
Railway Utility Company	502-504
Railway Improvement Company	508-510
The Railway Materials Company	531-533
St. Louis Car Company	540
Safety Car Devices Company	19
Simmons-Boardman Publishing Co.	10A
Star Brass Works	574
A. Stucki Company	528
Sattley Company	582
George W. Saums Company	511
The Peter Smith Heater Company	583
Standard Underground Cable Company	405
Stafford Roller Bearing Car Truck Corp.	104-106
The T. H. Symington Company	570
S. K. F. Industries, Inc	215
The Sherwin-Williams Company	578-580
Taylor Electric Truck Company	111-113-115
The Timken-Detroit Axle Company	584-585-586-587
The Texas Company	8A
Transit Equipment Company	532
The Trolley Supply Company	556-557
Tuco Products Corp.	526
Tool Steel Gear & Pinion Company	618
United Lead Company	518
The United States Graphite Company	530
The Universal Lubricating Company	509
Wheel Truing Brake Shoe Company	513
Western Electric Company	515-517-519
Westinghouse Traction Brake Company	144
Westinghouse Companies	21-15A
Westinghouse Electric & Manufacturing Company	15B-216
William Wharton, Jr. & Company, Inc.	588-589
The White Company	133 to 147 incl.
Waukesha Motor Company	117-119

Entertainment Committee

A MEETING of the committee appointed by President Emmons to plan for the entertainment at Atlantic City convention was held in the office of the association on July 2. Those in attendance were: J. C. McQuiston, chairman; William Arthur, C. H. Beck, E. C. Faber, J. H. Hanna, George R. Lyman, L. H. Palmer, L. W. Shugg, K. A. Simmon, E. P. Waller, H. W. Blake for H. L. Brown, and George L. Draffan for E. F. Wickwire.

While it is too early yet to outline the entertainment features considered, the committee gave full consideration to afternoon entertainments for the ladies and evening programs. Chairman McQuiston reported a visit to Atlantic City with Mr. Welsh, and that the various principal hotels had expressed a willingness to co-operate.

Maintenance of Equipment

Air-Operated Scarifier and Ice Cutter

An ICE CUTTER and scarifier which was constructed by the Easton division of the Lehigh Valley Transit Company has proved a great convenience and labor saver. A Brill-21 truck was used, but an additional pedestal opening was installed in each of the side frames to provide clearance for operating the teeth.

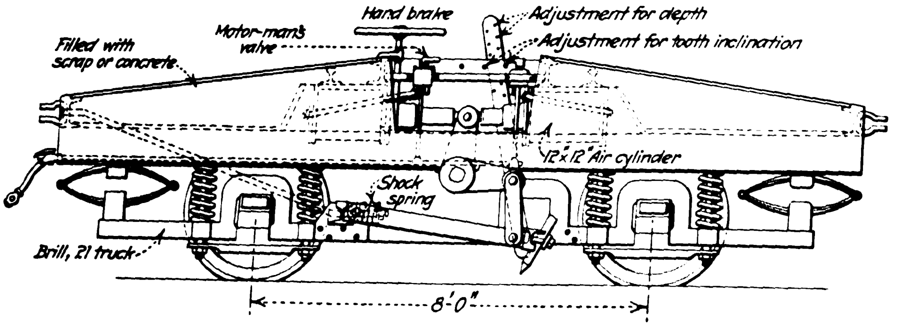
The wheelbase was made 8 ft. The steel teeth are supported by a rail with slotted recesses to receive them, and they are held in position by a steel bar which passes back of the teeth and is bolted to the web of the rail. This supporting rail fulcrums about a point just ahead of the rear pair of wheels. An additional cross-rail has been installed at this point for strength and to give the necessary support. The arms connecting the rail which hold the teeth to the fulcrum point are fitted with a shock-absorbing spring.

The raising and lowering of the teeth, together with the supporting rail and mechanism, are accomplished by means of two 12-in. x 12-in. air cylinders. These are placed in tandem with a bell-crank lever fastened to the middle of the connecting rod. This bellcrank lever fulcrums about a support at the top of the truck, and the movement of the air-cylinder pistons back and forth causes the opposite end of the bell crank lever to rise, thus raising or lowering the steel teeth.

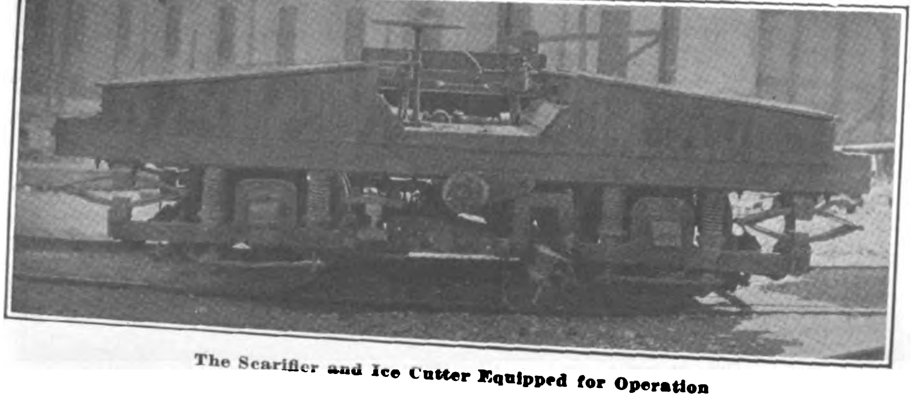
A standard motorman's valve controls the air pressure to the operating brake cylinders. The car is not equipped with a compressor, but through an air-hose connection receives its air supply from the car which hauls the scarifier.

When the steel teeth are lowered into position they are held by vertical adjusting bars which are bolted into position to regulate the depth of cut. This vertical bar can also be adjusted to give different tooth inclinations. Various holes are provided in the bar and in the cross support for bolting. The top part of the scarifier is filled in with concrete to give the desired weight for holding it in position during operation. The draft rigging is connected direct to the arm which supports the teeth, so that none of the strain is transmitted through the truck framework.

This scarifier was designed by M. C. Garlick, supervisor of tracks for the Easton (Pa.) Transit Company, and has proved economical for ripping up asphalt and macadam paving. It also was of considerable use for removing ice from between the rails and for a distance outside the rails during the past winter. The accompanying drawing shows details.



Details of Construction of Air-Operated Scarifier and Ice Cutter

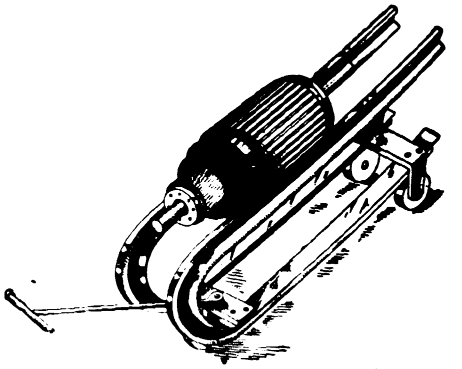


The Scarifier and Ice Cutter Equipped for Operation

Unique Armature Truck Made from Old Rails

IT IS the practice in the shops of the Buffalo & Lake Erie Traction Company, Erie, Pa., to store upon two racks about 12 in. above the floor the armatures awaiting repair. As a means of transporting the heavy armatures, a simple truck has been made of old rails.

Two rail sections, each about 11 ft. long, and bent in the shape of a long narrow letter U, form the framework of the truck. The U rests upon one of its arms with the curve at the front end of the truck and the upper arm in the same vertical plane as the lower arm. The other rail is similarly shaped and placed about a foot distant from the first. Thus an armature can rest securely between the two upper arms, with its axis parallel to the length of the truck.



Armature Truck Made of Rails

Under the lower arms are fastened three 6-in. cast-iron wheels. At the front end is a hinged tongue by which the truck is moved. The particular advantage of this shape of vehicle for carrying armature lies in the fact that it can be backed in at right angles to the repair rack, with its lower arms just under the iron frame of the rack and its upper arms just above. Heavy armatures can then be rolled sidewise onto and off the truck with little effort.

Different Colors for Tools Prevent Misplacement

AT THE Connellsville, Pa., shops of the West Penn Railways a number of portable tools are in use that help greatly to speed up work. These belong to various shops, but may be taken out on special jobs anywhere about the shops or yards. In order to prevent misplacement of such tools after the completion of such work, they have been painted with separate distinctive colors for each shop. Thus, for instance, a tool painted brown is seen at once to belong to the carpenter shop, and there can be no argument regarding the ownership.

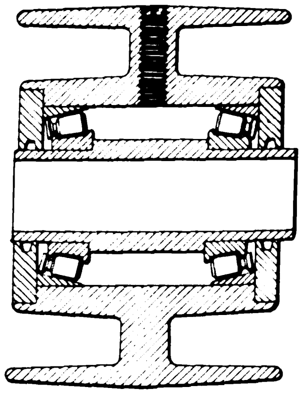
The adoption of this plan has made it much easier to keep the tools on hand in their proper places, so that they are always available when they are needed, and in this way emergency work about the shops is facilitated greatly.

New Equipment Available

Taper Roller Bearings Applied to Loose Pulleys

ADJUSTABLE taper roller bearings with provision for taking the end thrust have been applied to loose pulley construction by the St. Louis Machine Tool Company, St. Louis, Mo. Roller bearings have been tried previously in loose pulley construction, but several disadvantages were found. The use of straight roller bearings did not provide the necessary features of wear adjustment and end thrust to make a good pulley, and the outside diameter in relation to the bore was so large as to eliminate this type of construction from use in the usual arbor pulleys on high speed machines where the pulleys were necessarily small.

With the construction now introduced by the St. Louis Machine Tool Company, the races can be made exceptionally thin so that loose pulleys can be made down to 2½ in. diameter by mounting the bearings directly on the shaft. This type of construction, however, is not preferred by the manufacturers, as they recommend mounting them on a sleeve as shown in the accompanying illustration. With this type of construction old and worn shafts or arbors can be saved, which frequently are worth as much as the pulley.



Loose Pulley with Taper Roller Bearings

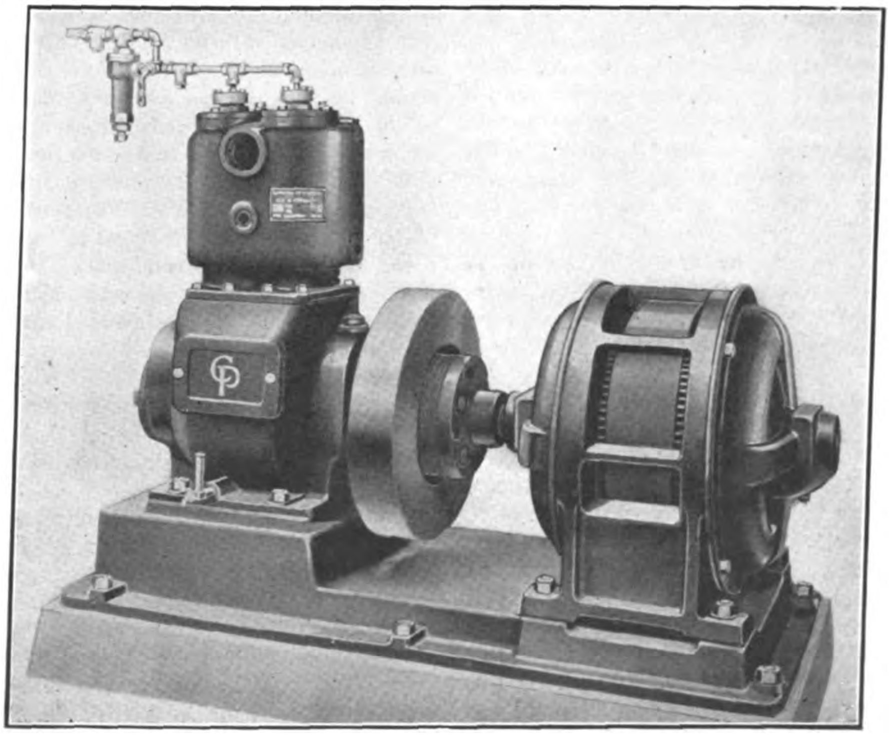
Pulleys of this new type are being supplied by the St. Louis Machine Tool Company for replacement on all classes of machinery in sizes from 2½ in. to 26 in. diameters. Hanger boxes and countershafts can also be equipped with this type of bearing.

Small Direct-Connected Compressor

THERE has always been a demand for small air compressors which can be directly connected to an electric motor, but, because of the speed restrictions imposed by the limited area of the compressor valves used, such combinations heretofore have been unavailable. As a result, belt drive and, in some instances, gear drive have been employed. The Chicago Pneumatic Tool Company, New York, N. Y., has recently developed a line of high-speed compressors which can be directly connected to electric motors or internal combustion engines by means of flexible couplings. The compressors are of the vertical, duplex, single-acting, water-cooled type, fitted with Simplate flat disk inlet and discharge valves. The straight and uniform lift of these valves affords a maximum of effective valve area which makes possible the speed at which these compressors operate.

These machines are built in three sizes, having piston displacements of 128, 160 and 215 cu.ft. per minute, and are suitable for working pressures of 150 lb. per square inch. The standard speed of these sizes is 600 r.p.m. Standard equipment includes hand starter for the motor and an inlet valve unloader for the compressor.

For places where the demand for

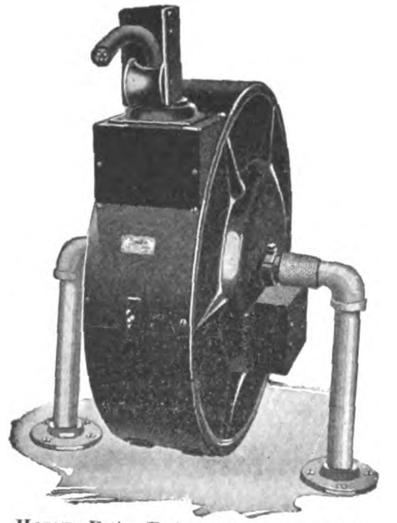


High-Speed Compressor Which Can Be Directly Connected to Electric Motors or Internal Combustion Engines air is intermittent, the motor can be furnished with an automatic starter which starts and stops the unit within predetermined pressure limits. When this type of starter is used, the compressor is equipped with a centrifugal unloader which automatically relieves the compressor of its load while the motor is starting up or shutting down. A water control valve is also furnished which is operated by air pressure governed by a centrifugal unloader, and since the lubrication is accomplished by a combination pump and splash system, the unit is automatic, as it accurately controls the electric current, air delivered, circulating water, and lubrication. The arrangement of drive makes these units very compact and eliminates transmission losses and troubles.

Extension Cable Reel

A NEW extension cable reel designed for laying out and automatically retrieving large sized electric conductors is being marketed by the Appleton Electric Company, Chicago, Ill. This device is particularly adapted for supplying current to machinery which requires a varying cable length, such as electric welding equipment and circuit breaker testing outfits.

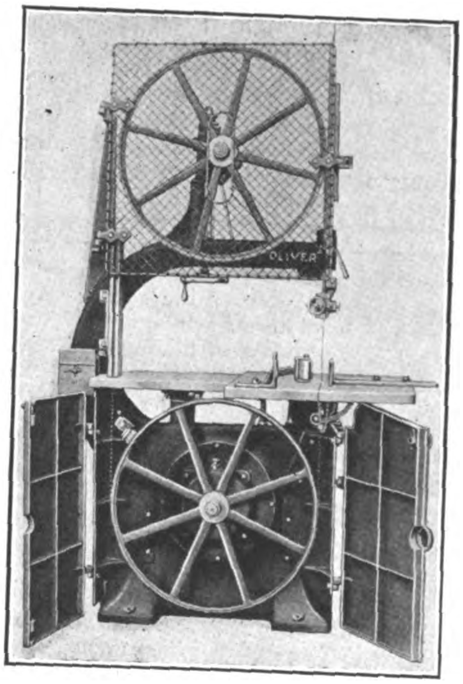
The heavy duty "Reelite" is furnished without brackets but with 1-in. male threaded hubs so that it can be mounted conveniently. Connections are made from the cable to heavy brushes, and the current is conducted through these and slip rings. The reels are furnished in different widths and with two- or three-wire commutator. This form of cable reel protects the cable and at the same time gives uninterrupted service.



Heavy Duty Extension Cable Reel

Shaftless Motor-Driven Bandsaw

A DIRECT motor drive for a bandsaw has recently been placed on the market by the Oliver Machinery Company, Grand Rapids, Mich. The illustration gives an idea as to how the rotor of the motor is mounted directly on the lower wheel shaft, which runs in ball bearings. The ball bearings are supported by two end bells, which have finished concentric tongues to fit accurately inside of the finished rings of the bandsaw frame, as well as the stator. This assures necessary alignment and easy access.



Bandsaw with Ball-Bearing and Motor Drive

The motors are fully inclosed and built in. When 1,700 to 1,800 r.p.m. motors are used, the company recommends the "attached belt drive" which supports the motor on a self-contained bracket bolted to the frame on a finished square pad and fitted with wire-mesh belt guards, endless leather belts and slide base with screw to take up for the belt stretch. With 600 r.p.m. motors, the company recommends the newly-created ball-bearing fully-inclosed drive as illustrated.

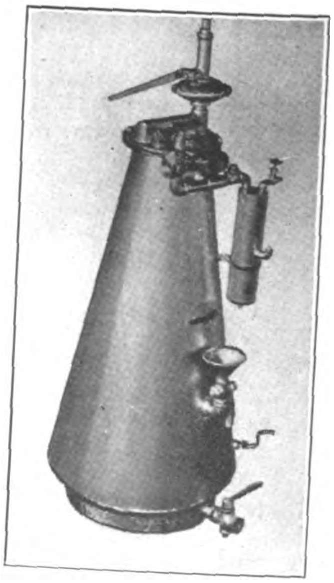
An important feature is the method of safeguarding the operator. Two safety guards are provided, one at the rear, which is U-shaped and made of wood, and one at the front which is L-shaped and made of steel with wood facing. These cover the blades at all points except the part doing the sawing between the guide and table. The lower wheel is incased by two iron doors which prevent danger to the operator and confine the sawdust to a limited area. The upper wheel is covered by a heavy wire-mesh door or guard, which is supported on a cast-iron hinged bracket attached to the column of the machine and is locked with a spring clasp.

The illustration shows the No. 16 bandsaw, which requires a motor of from 3 to 5 hp. and runs at a speed of 600 r.p.m.

Portable Welding Gas Generator

A PORTABLE acetylene welding generator designed to obviate the use of high-pressure cylinders has recently been placed on the market by the Alexander Milburn Company of Baltimore, Md., manufacturer of oxyacetylene welding and cutting equipment. The generator is of 30-lb. carbide capacity, or the equivalent of 50 cu.ft. cylinder gas. It has few parts, operates automatically with no clock or motors, and has a steel body welded throughout.

This generator fills a demand for a source of acetylene gas without the transportation delays and higher costs of cylinder gas. It may be handled by two men, two handles welded to the machine being provided for this purpose. The generator has a device for locking the carbide in place while it is being moved. The hopper and cast head which houses the feed control are assembled in one unit. The equipment weighs approximately 200 lb., and has a diameter of 2 ft. at the bottom, 1 ft. at the top and is 5 ft. 3 in. high.



New Welding Gas Generator

The News of the Industry

Wages Advanced

New York & Queens County Employees Receive Increase as Well as Share in Increased Revenue

In accordance with an announcement of Lincoln C. Andrews, receiver of the New York & Queens County Railway, employees' wages were increased effective on July 1. The new scale in cents per hour for motormen and conductors is as follows:

First year	47
Second year	49
Third year	51
Fourth year	52
Fifth year—ninth year	5
Tenth year and thereafter	55

Operators of one-man cars will receive 5 cents an hour in addition to the regular rate.

The scale just mentioned amounts to an increase of 2 cents an hour for all other than first-year men. This increase of 2 cents an hour will be given to all employees of the shop and line departments who are paid on an hourly basis.

In addition to the increased pay scale the receiver announced a plan of the company for sharing the increased car revenue with the employees. He explained that for the past year the passenger revenue per car-mile had averaged a little more than 29 cents, and since the receivership it had averaged just under 31 cents. He said that taking the receivership average of 31 cents as the base, the company proposed to increase the regular pay of the men each month by as many cents an hour as they could make the average car-mile revenue of the month before greater than 31 cents. For example, he said that if the average car-mile revenue for June was 32 cents the July pay would be increased by 1 cent an hour. If during July there was an increase in car-mile revenue to 34 cents, then the monthly pay in August would be increased by 3 cents an hour. Simplified, it meant that if each operator would pick up only one more fare for each car-mile of his run then the average car-mile revenue would be increased by 5 cents, and the employees' pay also by 5 cents.

The plan, which was launched not only for the purpose of giving the men an increase in pay but also for increasing the revenue of the company, went into effect on July 1, and during the month of July all the men included in the plan will receive, in addition to their regular hourly rate, an increase equal to the excess of the average car-mile earnings for June over 31 cents.

Mr. Andrews further went on to explain how every man in the company, the transportation man, the shop man, the line man, and every employee, could help to increase the car-mile earnings in his own particular job. There are two restrictions, however, on the plan for increased pay. The first is that a man must work at least 150 hours during the month in which the increased earnings are created in order to receive the increased rate during the following month. Further, where a liability accident has resulted in a settlement in favor of the claimant and where investigation has shown that the accident was the fault of the motorman, upon the decision of the general manager, the motorman in question shall forfeit thirty days of his increased pay, effective immediately after the decision of the general manager. These are the only restrictions.

The New York & Queens County Railway went into receivership five months ago. Mr. Andrews stated that during these months, thanks to the help of the many loyal employees, conditions have gradually improved until it seemed almost possible that the railway could be made a successful venture again. The management, he says, wanted increased revenue which it could get only by having more car riders and car fares. He said that the management would do all that it could, but the employees could do even more in securing increased income.

Service Improvements in Peoria

The city of Peoria put into effect a new car routing Sunday morning, July 1, in accordance with the plans and recommendations submitted some time ago by John A. Beeler, New York. The lines changed were Knoxville Avenue and Garden Street. The Elizabeth and Hurlburt lines and the Second and Sixth Street lines were combined. No changes were made on the Main, Bradley, Lincoln, Adams or East Peoria lines.

Street collectors are to be stationed in the Loop district during the rush hours to collect fares and assist in more rapid loading at the heavy load points in the business district. They will be placed at Fulton and Adams, Main and Adams, and Main and Jefferson Streets.

The approval of the Beeler plan, which provided for the rerouting and wiped out a number of out-of-date franchise requirements such as fixed headways established a generation ago, was recently approved by the City Council by a vote of fifteen to two. The cars are now operating on new schedules where they better fit the present day traffic requirements. An enlarged use of one-man cars was recommended.

Electrification Must Wait

President Rea in Discussing Changes Incident to Philadelphia Fire Opposes Any New Work Now

Further electrification of lines of the Pennsylvania Railroad system in and about Philadelphia or elsewhere is something to be hoped for but not realized for some time to come.

COST PROHIBITIVE NOW

In a letter sent on June 28 to William R. Tucker, secretary of the Philadelphia Board of Trade, Samuel Rea, president of the railroad, made it quite clear that the matter of electrified improvement of the lines of the Pennsylvania system cannot be considered as a possibility for some years. He said:

> The cost is prohibitive at this time, and, aside from that, the regulatory policies of both the Federal and State Governments do not leave sufficient balance in the company treasury to warrant the carrying out of any expensive reconstruction plan.

Electrification of the Chestnut Hill branch running out of Broad Street Station and also of the Main Line branch as far west as Paoli was completed some while ago. Since then nothing further in the way of operating trains electrically has been done in and about Philadelphia.

Mr. Rea's letter to Mr. Tucker was in response to a communication from the Secretary of the Board of Trade, as to just what the company's expansion plans provided in connection with the reconstruction of the damaged section of the Broad Street Station plant, which was partially destroyed by fire some weeks ago.

ENHANCED EARNING POWER NECESSARY

In the course of his comments on the matter Mr. Rea said in part:

> So far as Philadelphia is concerned, the Pennsylvania Railroad has endeavored to give it the best local and through service at three important centers — Broad Street, West Philadelphia, and North Philadelphia. The company, likewise, has proceeded, as far as its earnings have permitted, with electrification of its various suburban lines, and, if the war had not intervened, electrification would have been materially extended on all of our important divisions reaching Philadelphia. We are certain that West Philadelphia is a most important center, which requires extensive station enlargements, yard improvements, and electrification, and it has one city rapid transit line and needs more. Then, North Philadelphia is also very important, showing a healthy traffic growth which will materially expand upon the completion of the Broad Street subway when it will only be six or eight minutes from City Hall.
>
> While all of these questions must have careful consideration it is needless to say that the immediate execution of any plan is, I regret, impossible. One of the reasons is that construction costs are out of all reason; and there is a considerable labor shortage. Our company could not undertake such a huge improvement until the future is clearer and its position with reference to railroad earnings power is materially enchanced, and is more nearly in accord with what it was many years ago.

Chicago's Mayor for Municipal Ownership

Says 1907 Settlement Franchise Has Failed—Wants Local Ownership and Operation at Fare that Will Meet Carrying Charges—Through Routes Should Be Diverted from Business Center.

MUNICIPAL ownership and operation of Chicago's surface and elevated lines was advocated as an immediate necessity by Mayor Dever in a special message to the City Council on July 2. The Mayor stated that in municipal ownership and operation of the city's local transportation systems lies the city's only hope for reduced fares, much needed extensions and improvements in service.

PURCHASE OF ALL LINES ADVOCATED

He proposed the purchase of the surface and elevated lines by the issuance of special bonds, to be retired by a fund derived from the companies' earnings. This plan, he declared, would make possible the acquisition of the lines by the city without the imposition of an additional burden upon the taxpayers. The proposed municipal system would include all lines of transportation now operating and would be designed to include subways when built.

The Mayor made it plain in his message that he would insist upon the municipal lines paying their way without loading an additional burden upon the taxpayers. He declared that improvements and extensions necessary to give Chicago adequate service would cost millions of dollars and that a privately owned company operating under a twenty-year franchise, which is the longest franchise permitted by law in Illinois, would not finance these requirements. He insisted, therefore, that the only solution of the local transportation problem is municipal ownership and operation.

The Mayor then proposed that the local transportation committee of the Council open negotiations at once in order that a detailed plan may be submitted to the Council when it reconvenes on Oct. 17. He wants a referendum vote of the people as soon as possible thereafter.

PRINCIPLES OF SETTLEMENT STATED

The basic principles of a proper settlement as outlined by the Mayor for the guidance of the City Council are as follows:

> 1. The traction properties should be municipally owned and municipally operated in such a way as to insure efficient service. The management and operation of the municipally owned properties should be placed in the hands of men of the highest qualifications and the employees should be selected in strict accord with the efficient enforcement of the civil service law.
> 2. The properties should be purchased at a fair price to the owners' but no more. This price should not be so low as to be confiscatory, nor so high as to be unjust to the car riders.
> 3. The properties should be so acquired and operated as to impose no burden upon the taxpayers. The purchase price of the properties and the interest, on the securities given in payment of this price should be paid solely out of the earnings of the properties.
> 4. The properties should be acquired with due regard to the necessity for a comprehensive engineering and financial plan for the building of the necessary extensions of and additions to the surface and elevated lines and for the construction of subways, as and where required, all with the least possible delay.
> 5. Improvidence in the building of additions and extensions and of subways must be avoided, so that the transportation system will be self-sustaining.
> 6. Any plan for traction settlement must be submitted to a referendum vote of the people.
>
> While certain items of a complete program of traction development may be otherwise financed, there are only two methods by which the program outlined above can be accomplished in its entirety; first, by the issue of general corporate bonds payable out of moneys raised by general taxation, and, second, by the issue of special bonds or certificates of the general character described in the report of Alderman U. S. Schwartz dated Dec. 19, 1921.
>
> The first method cannot be used, for the reason that the city has practically exhausted its general debt incurring power and, without amendment to the state constitution, cannot borrow by that method such sums as would be necessary to acquire a complete and adequate transportation system.
>
> The second of the two means above mentioned presents a more feasible method for accomplishing municipal ownership of the lines. Moreover, this method insures the economic operation of the lines without recourse to general taxation. The municipal ownership act of 1913 expressly requires that the principal of, and interest on, such special bonds shall be paid solely out of the earnings of the transportation properties.
>
> In 1920, our Supreme Court held that the charges for services rendered by a municipally owned public utility are simply to be high enough to produce revenue sufficient to bear all costs of maintenance and operation, to meet interest on bonds, and certificates issued on account thereof, and to permit the accumulation of a surplus, or sinking fund sufficient to meet all outstanding bonds or certificates at maturity.
>
> With all politics eliminated, the fares can be substantially lower than those now exacted by the private companies. Indeed, the car fares must be the lowest possible without resort to taxation.

1907 ORDINANCES HAVE FAILED

Mayor Dever declared that the 1907 ordinance of the railways had failed of enforcement and that the whole theory of the 1907 ordinances had been upset by the passage of the state public utilities act in 1913, which deprived the city of home rule. By acquiring the ownership of these lines, the Mayor pointed out, Chicago would again secure home rule as municipally owned properties are not under the jurisdiction and control of the state commission.

The Mayor also said that no plan should be considered which involves a continuation of private ownership or private operation under the guise of municipal ownership and operation.

Britton I. Budd, president of the Chicago Elevated Railroads, announced the day after Mayor Dever presented his message to the Council that the elevated lines were open to negotiations. He said:

> In suggesting unification of the local transportation lines, with needed extensions and development of a rapid transit system, Mayor Dever has voiced the needs of the city. So far as the elevated railroads are concerned they will have no objection to any reasonable proposition from the city for acquiring the properties. The crying need is for further rapid transit development, including subways in the central district of the city. We are ready to negotiate with the city on any basis it may wish.
>
> We are principally interested in seeing a solution of the transportation problem which will allow Chicago to grow and which will be fair alike to the people who have invested their money in the properties and to the city.

Mr. Dever in his message to the Council said that the private companies operating the surface and elevated lines had failed to furnish adequate service or to develop their properties to keep pace with the growth of the city. He then outlined some of the things he thought should be done such as the construction of rapid transit lines, building of extensions, planning for the future, etc.

President of New York Central Questioned on Schenectady Strike

A. H. Smith, president of the New York Central Railroad, was questioned for an hour recently by Bernard L. Shientag, State Industrial Commissioner, on the Schenectady Street Railway strike, in effect since May 16. Mr. Smith said he was not familiar with any contract the company might have with its employees, and did not have much time to watch traction operations. He promised, however, to look into the matter.

Wage Difference Adjusted in Muskegon

The Muskegon Traction & Lighting Company has settled its differences with its platform men.

The difficulty arose over recognition of the union. Two years ago the agreement between the company and men terminated and there has been much discussion over the question. Two weeks ago the men demanded action and at a special meeting of the board of directors it was voted to enter into agreement again. At a second meeting the agreement was approved.

The Muskegon men at first asked for an increase of 2 cents an hour rather than the bonus put into effect on Jan. 1. The bonus amounts to about 2 cents an hour providing the maximum is paid. Later the employees waived the wage question and said that they were well satisfied with the bonus plan once it had been explained to them.

With respect to the bonus practically all of the seventy platform men of the company will share in the full amount of the bonus provided by the company in April. The first bonus was payable on July 1, having been retroactive from Jan. 1. The maximum bonus is $40 semi-annually.

The company issued a rule book at the time the bonus plan was placed in effect, setting forth the number of points that are to be deducted for violating the various rules. The company announced that its one desire in granting a bonus was to improve the service to the public. Every employee starts with 1,000 points and those having 800 points at the end of six months are paid the full bonus announced by the company.

Railway States Wage Facts

Crisis in Transportation Confronts Chicago, According to Surface Lines President, Who Appeals to Public in Wage Controversy—Many Interesting Tables.

Henry A. Blair, president of the Chicago Surface Lines, recently published in the daily papers as a display advertisement an open letter addressed to Mayor Dever setting forth the pertinent facts in the wage controversy which at that time threatened to reach a crisis in a strike. The letter stated that for a number of years the surface lines have been forced to fight for their very existence.

Mr. Blair sees the surface lines harassed by unfriendly interests and much of their corporate energy expended in an attempt, thus far successful, to protect the rights of the public they serve and of the investors whose millions have made the great system possible. He says that during these trying years the searchlight of an antagonistic foe has been turned upon the companies and that every phase of their operations has been analyzed.

The facts in regard to the high hourly wage paid by the company as presented by the company for comparison were as follows:

	Increase Over 1914
Trainmen, Chicago	119 per cent
Carpenters	92½ per cent
Structural iron workers	84 per cent
Sheet metal workers	82 per cent
Painters	79 per cent
Bricklayers, electricians, plasterers, hoisting engineers, plumbers, steamfitters and tile setters	66⅔ per cent
Building laborers and plastering laborers	81 per cent

Mr. Blair said that although the ordinance specifically provides that the city's traction fund may be used to reduce rates of fare, not one dollar of the more than $30 500,000 accumulated since 1907 has been spent by the city for the benefit of the car riders. Figures for three years showing the volume of transportation by classes were presented to show the vastness of the system and its importance as a means of transportation to Chicago car riders. The figures follow:

With reference to the wages paid to trainmen in other cities the following table was included in the statement to "indicate how far in the lead we are in Chicago":

City	Rate	Time to Reach Maximum
Chicago	65–70	1 year
New York	45–61	9 years
Philadelphia	59–64	1 year
Detroit	55–60	1 year
Detroit Municipal	$4.50 to $5 per day	1 year
Cleveland	55–60	1 year
St. Louis	50–65	3 years
Boston	48–61	1 year
Pittsburgh	61–67	1 year
Buffalo	50–55	1 year
San Francisco	46–54	2½ years
San Francisco Municipal	$5 a day	
Milwaukee	50–56	2 years
Washington, D. C.	50–56	1 year
Cincinnati	43–48	1 year

Mr. Blair says:

A public service, like a public office, is a public trust. And the public should resent any interference with the proper and orderly conduct of its business.

Justice and fairness demand that a service like this should receive a fair return upon its investment. The surface lines, since the 7-cent fare was established, are earning on the basis of 5.7 per cent on the capital account. The gross revenue in the last fiscal year was $56,103.061.

The following table was presented to show how each dollar of revenue was distributed:

		Cents	Cents
Operating Costs	Wages	50.08	80.28
	Material, power, taxes and all other operating expenses	30.20	
Sinking fund and interest obligations			14.78
55% to city of Chicago			2.97
Remainder for distribution to the companies			1.97
			100.00

In conclusion Mr. Blair said that the company was ready and willing to submit the whole question of wages and working conditions to disinterested arbitration. An arrangement to this effect has been made, as noted previously in the ELECTRIC RAILWAY JOURNAL.

Year ended Jan. 31	1921	1922	1923
Revenue passengers	769,025,413	750,515,622	762,629,211
Employees, policemen and firemen carried free under the ordinance	32,469,288	35,724,585	38,801,339
Transfer passengers	551,676,792	547 522,102	557,331,999
Total	1,353,171,493	1,333,762,409	1,358,762,549
Per cent of transfer passengers to revenue and free passengers	68 83	69 64	69 54

In the nine years of a unified system the surface lines poured more than $45,600,000 in public benefits divided as follows:

	Nine Years	Average Per Year
Cleaning right-of-way, including sprinkling and removal of snow and ice	$5,026,615	$558,512
Street paving	5,157,881	573,097
Maintaining paving	2,837,162	315,240
General taxes	14,673,008	1,630,334
Track and overhead removal and replacement account sewer installation, etc.	388,449	43,161
City's proportion—55 per cent of net earnings for traction fund	17,588.453	1,954,272
Total	$45,671,572	$5,074,619

One-Man Car Operators in Dayton Receive Increase

The Oakwood Street Railway, the City Railway and the Dayton Street Railway, all operating in Dayton, Ohio, have entered into contracts with their employees whereby the men will receive increases in pay.

One-man car operators of these lines, effective May 15, will receive 51 cents an hour for the first three months, 53 cents an hour for the next nine months and 55 cents an hour thereafter. The scale on the City Railway and Oakwood lines prior to the starting of one-man car operation was 41, 43 and 45 cents an hour. When the new type of cars was placed in operation these rates were advanced to 46, 48 and 50 cents an hour, which was similar to the scale being received by employees of the Dayton Street and People's Railways.

This scale is still in force on the People's lines. Under the terms of the contract, if any of the three other roads in the new agreement operate two-men cars, the 46, 48 and 50 cents an hour scale will prevail.

Announcement was also made of a wage increase granted the employees of the Dayton & Western traction line. Retroactive to May 16, their scale will be 43 cents an hour for the first year, 45 cents for the second year and 47 cents for the third year, with 50 cents an hour for the fourth and each succeeding year.

Settlement to Be Reached Without Strike

Although no settlement has been reached in the wage controversy of employees of the Des Moines City Railway threats of a strike which a week ago seemed imminent have apparently subsided.

The company is standing on the arbitration award made by Rev. Elmer Nelson Owen and the men temporarily at least are not pressing the demand that the question of the wage award be submitted to the five judges of the Polk County District Court to decide whether it was a matter for arbitration.

The men have submitted a communication to the company stating that they would agree to abide by the arbitration award if the back wages of $59,000 in a previous arbitration were paid.

F. C. Chambers, president of the railway, then replied to the men declining to act upon the proposal for the reason that the Kirbey award, under which the men demand the back pay, is a claim against the receiver of the Des Moines City Railway rather than the company and that it is a matter now before the United States Court and that the decision which Judge Wade will make must be final. He further points out that the company has no moral or legal right to make such a settlement as demanded by the men, and if it did it would be in direct violation of the obligations of the company under the terms of the present franchise.

Mr. Chambers also calls attention to the fact that the men have been paid and still retain $59,000 more than was due them in view of the fact that the Ladd arbitration committee handed down an award which as a matter of contract must be held effective as of March 1, 1921. Mr. Chambers cites that even though the present demand for back pay was a just one it would not equal the amount paid in excess of the Ladd committee award.

The union men have announced through the daily press that they will make every effort to settle the controversy without a strike.

Scranton Wages Advanced

Arbitrators Fix Scranton Railway Employees' Wages at 55, 60 and 63 Cents—Company Dissents

The arbitrators appointed to decide the wage issue between the Scranton Railway and its Amalgamated employees have submitted their findings, which give the platform men an increase of 3 to 5 cents an hour. The new rate will be 55 cents for the first three months, 60 for the next nine months and 63 cents after one year.

The issue between the railway and its men was one of wages. The company was paying the motormen and conductors 50, 55 and 60 cents an hour, but the men were demanding 60, 65 and 70 cents. The fifth arbitrator or referee was Bishop M. J. Hoban, who signed the award.

The second demand of the men was that dispatchers and cash and ticket receivers should receive $200 a month. The award gave these employees an increase of 5 per cent on their present monthly wages. A third demand was that the wages of all track men should be 65 to 85 cents an hour according to the scale offered, and in the award these trackmen were allowed an increase of 7 per cent on the present hourly rate of wages. It was also demanded that carhouse men, shop men and power-house men should receive 65 to 85 cents an hour as per scale offered. In the award these men are granted an increase of 7 per cent on their present hourly and monthly rate.

The award specified that the back pay of each class of employee should be allowed on the basis of the wages awarded from April 1, 1923. The company was allowed ninety days from the date hereto for the payment of the back pay.

WILL ACCEPT DECISION

Bishop Hoban, chairman, in his award complimented the members of the board of arbitration on the kindly feeling that had existed and acknowledged the ability of the counsel who prepared and offered in evidence a remarkable array of exhibits, which was of great value to the arbitrators in making their award.

The award was signed by the arbitrators for the men, but dissented upon by the arbitrators for the company.

The company, though dissenting from the arbitration awards, announced that it would stand by Bishop Hoban's findings.

The company in its dissenting opinion states that it disagrees with the award because it places upon the company a burden that must eventually be borne by the traveling public. In 1920 the conductors and motormen received a 20 per cent increase, and other employees 12 per cent. Since the present management acquired control of this company in 1906 there has not been a reduction in wages.

The company further contended that under the evidence the wages of the conductors, motormen, trackmen and laborers in the shops should not have been changed, and that the company should have an opportunity to provide for the large outlays which are absolutely necessary to placing property in shape to serve the public safely, efficiently and adequately. The company takes this stand, it says, particularly in view of the fact that for the past six years at least the earnings have at no time reached the amount fixed by the Public Service Commission and approved by the Appellate Court as a fair return from the property.

Wages Increased Five Cents an Hour.—As the result of a wage increase amounting to 5 cents an hour, employees of the Hudson Valley Railway, Glens Falls, N. Y., will receive the basic rate hereafter of 50 cents. The line operates from Troy northward to Warrensburg and several other points.

Settlement Reached.—The controversy between the linemen employed by the Springfield Street Railway, Springfield, Mass., and the management has been settled, it is announced by Manager Flanders, through a compromise arrangement by which the linemen receive a smaller wage increase than they had sought. This is believed to have removed all danger of a strike.

Franchise to Be Granted.—The Lake Shore Electric Railway, Cleveland, Ohio, will be granted a new twenty-five-year franchise through Sandusky County as a result of a conference between county and railroad officials held at Fremont on June 29. The railroad is to pay $12,500 to the county and make an annual payment of $1,000 during the life of the franchise.

League for Safety Formed.—Employees of the Morris County Traction Company, Morristown, N. J., have formed a Safety League, the object of which is to reduce the number of accidents to men connected with the road and to the public as well. Their slogan is "Safety first. Safety always." Later the league will organize a junior league for school children. The league will display placards in the trolley cars.

Wages Advanced.—Trainmen of the Nashville Railway & Light Company have been granted an increase in wages of 2 cents an hour. The scale in cents per hour is as follows: First three months, 40 cents; next nine months, 42 cents; second year, 44 cents; third year, 46 cents; fourth year, 48 cents, and after the fourth year 50 cents. The rate for operators of one-man cars will be 5 cents an hour above the regular scale.

Wages to Go to Arbitration.—After several conferences employees and officials of the Cincinnati Traction Company have failed to come to an agreement in the settlement of the employees' demand for an increase in the wage scale amounting to 17 cents an hour for all "platform" men. The matter now must go to an arbitration board, according to the existing agreement between the two bodies. According to the agreement a representative will be selected for the employees and one for the traction company and these two, in turn, will choose a third member.

Accidents Decrease Where Employees Are at Fault.—Statistics for the first five months of 1923, just compiled by the Georgia Railway & Power Company, Atlanta, show an increase of 25 per cent in traffic accidents in the city during that period as compared with the first five months of 1922. The company states, however, that there was a notable decrease in the number of street car accidents where the motormen or conductors employed by the company were totally or partially to blame.

Last Year's Reduction Canceled.—An agreement has been reached between officials and the "blue uniform" employees of the Cumberland County Power & Light Company, Portland, Me., whereby the men will have restored to them the 10 per cent wage reduction which they voluntarily accepted last year in order to help wipe out the company's deficit. The men recently petitioned for a wage increase of 20 per cent. With the new scale in force the men will be receiving 55 cents and 60 cents for two-man cars and one-man cars respectively. The demands of the men were referred to in the ELECTRIC RAILWAY JOURNAL, issue of May 19, 1923.

Safety Council Graduates Receive Diplomas.—The Chicago Elevated Railroads has the largest group of any organization in the graduation class of the Chicago Safety Council of the Chicago Association of Commerce this year. Diplomas were awarded to a record class of 750 men and of these 104 were employees of the Chicago Elevated Railroads and sixteen employees of the Chicago, North Shore & Milwaukee Railroad. The graduation banquet, held at the Hotel Morrison, was attended by more than a thousand persons and was the biggest party ever held by the Safety Council. The men who received diplomas were graduated from the council's foremen's instruction course.

Improvements Depend Upon Franchise Extension.—Extensive improvements and extensions to the service and system of the Virginia Railway & Power Company, operating the railway system in Richmond, are planned in the event a franchise of sufficient tenure of life is granted by the City Council. E. Randolph Williams, counsel for the company, said recently that the information on contemplated extensions was before the City Council, but that the work could not be undertaken unless the life of the franchise asked for was reasonable in length. The plans include a new Barton Heights line to the Ladies' Mile Road; a new South Richmond line, a line out Broad Street Road to Westhampton, and an entirely new line to the National Cemetery out Williamsburg Avenue.

Financial and Corporate

Oppose Abandonment

Communities Urge Continuance of Jersey Central Traction Line—Condition of Property Unsatisfactory

A strong sentiment in favor of continuance of the operation of the Jersey Central Traction Company was shown at the hearing of the Public Utility Commission, June 11, by the representatives of the various municipalities served. No way was suggested, however, to make the operation of the railway a paying proposition. It was shown that large losses have been incurred during recent years and the company is disinclined to continue.

C. L. S. Tingley, vice-president of the American Railways, which controls the Jersey Central Traction Company, stated that the valuation of the property as of Dec. 31, 1922, was claimed to be $1,882,582. A valuation was fixed by the Board of Public Utility Commissioners as of Dec. 31, 1915, amounting to $1,851,422 and additions from that date until Dec. 31, 1922, amounting to $31,160, making a total valuation of $1,882,582 upon which the company is entitled to receive a reasonable return, which at the rate of 7 per cent per annum would amount to the sum of $131,780.74.

The property of the Jersey Central Traction Company was taken over by the American Railways in the spring of 1917 and since then the revenue of the company has not been sufficient to provide for any dividend on the outstanding securities and for the past few years has not been sufficient to meet even the operating expenses. Various rates of fare, ranging from a 5-cent flat fare to a 10-cent flat fare, the latter being charged in conjunction with a special commutation rate, have been tried on the property in the hope of producing at least sufficient revenue to meet operating expenses, but without success. Since Jan. 1, 1923, a flat rate of 8 cents per zone has been in effect. The six months' experiment with a 10-cent flat rate in combination with a commutation rate, which was tried from June 1, 1922, to Dec. 31, 1922, inclusive, proved to be a failure in the matter of increasing revenue and even with the existing 8-cent fare the traffic is gradually falling off and the revenue correspondingly decreasing, whereas operating expenses are on the increase.

The condition of the company's property, particularly the track, is very unsatisfactory and a large sum would be required not only to place the track in safe and proper operating condition but also to meet the recommendations and requirements of the state, county and municipal authorities. Mr. Tingley stated that, having tried every known means to keep the property in operation, and the parties who had advanced the money to make up the deficits which had been incurred during the past few years having refused to advance any further funds, it was deemed advisable and even necessary that the company should cease operations. In reply to questions he stated that the company did not propose to substitute any other form of transportation in place of the trolley system, but planned to tear up the tracks and sell the rails and equipment for their scrap value. He said, however, that the company would be glad to turn over for its scrap value the whole property or any portion thereof which interested parties might desire to take over for the purpose of operating it as a trolley line.

It was demonstrated that for the years 1918 and 1919 there had been a gross income of $38,497 and $42,086, respectively, for the years 1920 to 1922, inclusive, and for the first four months of 1923 there had been a marked deficit, ranging from $7,781 in 1920 to $27,991 in 1922 and $29,728 for the first four months of 1923. This statement also showed that there had been a continued deficit in the net income of from $6,538 in 1918 to $93,575 in 1922 and $51,637 for the first four months of 1923. This, with the preferred stock dividend of $36,000 per annum, caused a total deficit ranging from $42.538 in 1918 to $129,575 in 1922 and $63,637 for the first four months of 1923.

MARKED DECREASE IN TRAFFIC RECENTLY

The statement of revenue passengers carried indicated an increase from 1916 to 1918, a gradual decrease to 1920, a slight increase in 1921, followed by a marked decrease in 1922, and a slight proportionate increase for the first four months of 1923. The maximum number of revenue passengers carried was in 1918, which was 5,134,630. This was explained to have been due largely to unusually heavy traffic incident to the activity of local industries engaged in the manufacture of war munitions and other war material. The population statistics indicated a generally slight increase in the communities served, the total population for 1920 being 37,324, as against 22,350 for 1910.

The statement in regard to the repairs necessary to place the track in proper operating condition indicated that it would require an expenditure of $266,474, in order to meet the demands of the various regulatory bodies. The analysis of operating expenses and deductions for gross income indicated a steadily increasing expenditure, ranging from $245,116 in 1918 to $321,531, in 1922 and $103,114 for the first four months of 1923. The deductions from gross income indicated a practically continual increase, ranging in totals from $45,035 for 1918 to $65,583 for 1922 and $21,909 for the first four months of 1923.

It was suggested that various ways and means might be adopted for reducing costs, such as the operation of one-man cars, discontinuation of non-paying trips, the elimination of extra, or "tripper," service during rush hours, the cutting in half of the existing fare zones and charging a flat 5-cent fare in each new zone thus created, and various other methods. The company replied that in some cases the suggestions had been tried, in others the suggestion was evidently impracticable and in still others the plan or one similar to it had been seriously considered but had not been thought advisable. It strongly emphasized that the falling off in traffic of the line was due to a very great extent to the competition of the privately owned automobile. Mr. Hitchcock, local manager, did not regard the population of the territory served to be large enough to permit operation on a successful basis.

Conditions Improved in Indianapolis

A general betterment in the financial condition, both of the Indianapolis Street Railway and the Terre Haute, Indianapolis & Eastern Traction Company in 1922, is shown in the annual reports of the two companies for 1922, made public on June 13 at the annual meeting of the stockholders.

The street railway's net earnings increased 17.07 per cent, or $216,918, over 1921, and the traction company's net earnings increased $114,967.

The street railway, after paying all fixed charges, including interest on bonds and deducting the amount required for sinking funds and for dividends, had a deficit at the end of the year of $26,909. The traction company, after paying all fixed charges and adding $214,046 to its sinking fund, had a balance of $226,336. It paid no dividends. Gross earnings thus far in 1923 are 8 per cent higher than in the same period of 1922.

The street railway on Sept. 1 resumed the payment of dividends, and has paid the quarterly dividends since, although it now is six quarterly dividends in arrears. The dividend payments thus far have been at the rate of $1.50 a share of preferred stock.

The report of the city railway mentions need for fifty new cars, for rebuilding carhouses and storerooms, erecting a new shop, and the construction of substations in the city. The statement is made that "all this requires money, which can not be obtained until the company's earnings are sufficient to place it on a safe and sound financial basis."

The reports of both companies mention the plan of the traction companies entering Indianapolis to erect freight terminals in Kentucky Avenue, which they say will establish Indianapolis as one of the most extensive electric railway freight terminals in the country, and also "entirely relieve the Indianapolis Street Railway from furnishing freight facilities, which in the past have been maintained at a loss."

Mayor Offers Plan for Financing Detroit Street Railways

A new plan for paying off the Detroit United Railway and financing the Municipal Department of Street Railways has been suggested by Mayor Frank E. Doremus of the city of Detroit. The plan includes the possible submission of a bond issue of $15,000,000 to put the now remaining debt on the same basis as that represented by the $15,000,000 of construction bonds authorized when the Detroit United Railway was taken over by the city.

In a statement by the Mayor it was pointed out that the contract for the purchase of the Detroit United Railway property required the city to pay in full in ten years the sum of $19,850,000. Because of this contract, the Department of Street Railways is required to set aside from earnings about $1,900,000 a year. This annual contribution to the sinking fund takes care of the payments of $1,000,000 annually to the Detroit United Railway, as well as the final payment of $7,580,000 due at the expiration of the contract in 1932.

If the Detroit United Railway debt was represented by long term bonds instead of the ten-year contract the Department of Street Railways would be required to set aside from earnings approximately $400,000 annually instead of $1,900,000. In other words, if long term bonds were issued and the Detroit United Railway debt settled there would be available from earnings about $1,500,000 in additional revenue with which to rehabilitate the tracks, purchase new cars and extend and improve the system generally.

A report on the finances of the Department of Street Railways by the Detroit Bureau of Governmental Research holds that the contract between the city and the Detroit United Railway now constitutes an unduly heavy financial burden, although held to be advantageous when the agreement was entered into. It is also the belief of the city controller that bonds could be issued at 4½ per cent or 4¾ per cent interest, whereas the city is now paying the Detroit United Railway 6 per cent under the terms of the contract.

According to the bureau's report, to finance from earnings the extensive program of rehabilitation necessary to needed service will require several years, if uninterrupted by business depression. A depreciation reserve, as such, has not been established, it is cited, but it is understood that the board of street railway commissioners agrees such a reserve is highly desirable as a means of determining actual property values, operating costs and proper rate of fare and contemplates the establishment of a depreciation account in the near future.

Among the conclusions drawn from the report is the statement that under the circumstances, creditable progress has been made toward solving the financial problems of the Department of Street Railways. The revenues of the department during the last eleven and one-half months are in excess of all charges made for operation and maintenance, except depreciation, and interest and sinking fund requirements. Reserves are being set aside in the sinking fund to provide for the payments of interest and to retire all outstanding bonds issued in behalf of the department.

Sufficient reserves are being set aside to meet the nineteen semi-annual payments of $500,000 each on the purchase contract with the Detroit United Railway and to make the final payment of $7,580,000 due in 1931.

Partial rehabilitation of the property acquired from the Detroit United Railway, some of which, according to the report, might fairly be chargeable to capital, has been effected and paid for out of earnings.

To complete the full program of rehabilitation promptly will necessitate either an issue of bonds or an increase in the rate of fare.

It is further pointed out that if earnings under existing conditions are applied toward rehabilitation, extensions to furnish satisfactory service must be provided by the issue of bonds or an increase in rate of fare.

Texas Railway Sells Notes Locally

The Northern Texas Traction Company at Fort Worth, Texas, has been successful in its campaign to sell $500,000 of 7 per cent notes to its patrons. The proceeds will be used to provide funds to pay for improvements and betterments. The campaign to sell notes was launched in March. It has been conducted by employees of the company.

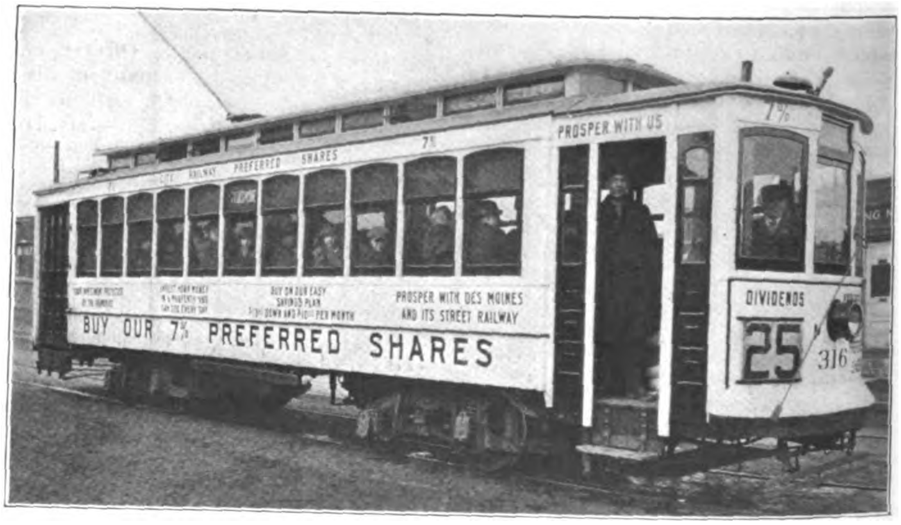
The extensions demanded by the city and agreed to as necessary by the company include lines to South Fort Worth, Sycamore Heights and Riverside. Surveys have been made for these extensions, and materials have been ordered with which to begin the work. The lines will be completed and service started early in the fall.

Favorable Results Announced on Des Moines Stock Sale

Officials of the Des Moines City Railway are well satisfied with the reception on the part of the employees and public of the 7 per cent preferred stock issue.

It is the first time that the Des Moines company has ever made an offer of stock to its employees or the local public and it feels that the attitude of both parties is entirely favorable. Among the employees the shop force is already 100 per cent sold and a number of the other departments have set a high mark. The trainmen are, of course, slower to get into the game, but officials of the company feel that progress is being made with them.

While the issue authorized was $750,000, no attempts will be made this year to put the entire amount on the market. No figures as to the amount sold to date have been announced, but officials say they will have no trouble in selling during the year an amount sufficient to finance the year's extensions.


PROSPER WITH US
7%
PROSPER WITH DES MOINES AND ITS STREET RAILWAY
BUY OUR 7% PREFERRED SHARES
DIVIDENDS
25
316

Car Used in Des Moines to Advertise Stock Issue

The campaign for the sale has been a quiet, consistent program, with grandstand methods entirely lacking. An advertising medium which caused considerable interest in the sale throughout the city was the use of one street car, painted white and with signs to tell the story of the sale, which was put into regular service on all lines in the city.

As a concrete result of the use of this means of advertisement E. L. Marriage, assistant to General Manager Chambers, cites the sale of a block of $2,000 worth of stock which went to an Italian miner. The miner saw the white car and became interested to the extent that he asked his boss about the stock. The mine owner being acquainted with officials of the street railway, called it to their attention and, after a few conferences, the Italian hauled $2,000 in currency out of a home-made bank. The currency was in small amounts and the bundles were tied with thread which was darkened with age and showed that the miner distrusted banks and had cached the money somewhere in his home.

Files Interest Default on Tidewater Railway Bonds

Order for a default on interest on the Birmingham-Tidewater Railway's first mortgage bonds was filed in the Federal court on July 2. The bond interest due July 1 amounts to $37,500 and Judge Grubb in his order instructs Lee C. Bradley and J. S. Pevear, co-receivers for the Birmingham Railway, Light & Power Company, not to advance funds for the payment of interest to the Tidewater from the proceeds of operations of the properties of their company.

It is pointed out in Judge Grubb's order that the operation of the Tidewater property, which has been under the Birmingham Railway, Light & Power Company receivers, has shown a constantly increasing deficit. It is also shown that the receivers have advanced a sum of $433,051 from proceeds of the operation of Birmingham Railway properties to the Tidewater up to May 31, 1923. Judge Grubb holds that in view of this heavy deficit, advance for interest should not be made.

Foreclosure proceedings against the Tidewater property it is stated cannot be started under ninety days. The bond interest, authority for payment of which was denied is due on an issue of $1,500,000 of first mortgage gold bonds of the Birmingham-Tidewater Railway dated Jan. 1, 1916, and payable at the Empire Trust Company in New York.

Sale of the Tidewater property or the junking of a part of the line and operation of the remainder by the Birmingham Railway Light & Power Company are considered the only alternatives.

Cheerful News for Traction Holders

B. C. Forbes, writing in the New York *American*, says that twenty railroad and traction companies have announced very cheerful dividend news for their stockholders within the last six weeks. As Mr. Forbes sees it the prospect is that the next six months will bring many other increased dividend checks for transportation company stockholders. He includes in his list of traction payments the following:

Fort Dodge, Des Moines & Southern Railroad resumed dividends at the rate of $1.75 quarterly on preferred stock—the first since May, 1921.

Charlottesville & Albemarle Railway declared quarterly dividend of 2½ per cent on common.

Philadelphia Company increased dividend from $3 to $4 basis on common.

Eastern Texas Electric Company increased quarterly dividend to $2.25 per share on common, compared with $2 previously.

Twin-City Rapid Transit Company increased semi-annual dividend on common from 2 per cent to 3 per cent.

Federal Light & Traction Company declared stock dividend of 75 cents a share in addition to regular dividend. Initial dividend paid on common.

United Light & Railways Company declared extra dividend of three-quarter of 1 per cent on common.

Columbus Railway Power & Light Company declared dividends of 6 per cent on common and 6 per cent on preferred "B" stock for the year.

United Railways Investment Company redeemed dividend certificates issued in 1906 and 1907, at par and interest to and including May 15, 1923.

Washington Railway & Electric Company resumed dividends at the rate of 1½ per cent on common, first payment since May 1, 1919.

The news of the declaration of these payments is not new, but the method of presenting them adopted by Mr. Forbes is somewhat unusual.

Auction Sales in New York.—At the public auction rooms in New York there were no sales of electric railway securities this week.

Abandonment Sought in Illinois.—Permission to cease operation and to dismantle its line between Yorkville and Morris has been asked of the State Commerce Commission by the Fox & Illinois Union Railway, Aurora, Ill. The line, 20 miles long, according to the petition, is losing money.

Preferred Stock Being Offered.—The Southern Securities Company of Madison, Wis., is offering for sale at par, preferred stock of the Madison Street Railway, yielding 7 per cent. Already about $55,000 of this stock has been sold to patrons of the company. The proceeds of the issue will be used for betterment and extensions to take care of the steadily increasing demands for the company's services.

Arrears in Dividends Being Paid.—The Fairmount Park Transit Company, Philadelphia, Pa., has declared a dividend of 3½ per cent on preferred stock for the six months ended June 30, 1923, and a dividend of 14 per cent against accumulation at the rate of 7 per cent for the years 1917 and 1918. The dividends are payable on July 10 to stock of record of June 30. There are still unpaid accumulated dividends for the four years from 1919 to 1922 inclusive.

Merger of El Paso Companies Proposed.—Merger of the three Stone & Webster traction companies in El Paso is proposed in application made by Alba Warren, vice-president and general manager of the El Paso (Texas) Electric Railway Company, for permission to combine his company and the El Paso & Juarez Traction Company and the Rio Grande Valley Traction Company. The merger is sought, Mr. Warren told the El Paso City Commission, to enable the company to obtain funds for needed improvements.

Offer Bonds.—Bodell & Company and P. W. Chapman & Company are offering at 99½ and interest to yield more than 7 per cent $500,000 of Fort Dodge, Des Moines & Southern Railroad ten-year debenture gold bonds known as series "A" 7 per cent. The bonds, callable on any interest date upon thirty days' notice, at 105 and interest, are dated June 1, 1923, and are due June 1, 1933. The proceeds of this issue will be used in part for the installation of the new 12,500-hp. turbine and the greater part of the balance for the 1923 capital requirements. The company owns electric lighting properties in six Iowa cities and towns operating under favorable franchises running to 1934-1939. The company owns 2,355 freight cars, eleven electric locomotives, eleven miscellaneous cars and thirty-two passenger cars.

Michigan United Sold Under Foreclosure.—Properties of the Michigan United Railways were purchased at Jackson on June 30 by the Irving Bank-Columbia Trust Company of New York City for $5,000,000 at a mortgage sale. The bank and trust company is trustee for the bondholders. The sale was made by William S. Sayres, Jr., Special Master of the United States District Court. The property includes a total of 258 miles of trackage and complete equipment for operating the interurban and street railway lines. The reorganization terms have been reviewed previously in the ELECTRIC RAILWAY JOURNAL.

Seeks to Abandon Part of Line.—The Southern New York Power & Railway Corporation, operating the Mohawk-Oneonta trolley line, applied to the Public Service Commission on June 29 for approval of a declaration of abandonment of that part of its line in Oneonta starting at Main and Broad Streets and running along Main Street to the east end of the line. The company claims that public convenience and necessity do not require further operation of that part of its line. Public hearing will be given on the petition.

Another Payment on account of Lorimer Failure.—Ten years of litigation resulting from the failure of the Southern Traction Company, one of the projects of former United States Senator William Lormier, was brought to a close by Federal Judge G. W. English in East St. Louis a few days ago when he entered an order authorizing Judge C. B. Thomas, referee in bankruptcy, to pay out all but $34,000 of the $400,000 realized by the sale of the road several months ago to the Alton & Southern Railway, an Aluminum Ore Company line. Under the court order the creditors of the defunct road will have received about 35 per cent when final settlement is made.

Change in Capital Structure Proposed.—The West Penn Company, a subsidiary of the American Water Works & Electric Company, has called a special meeting of its stockholders July 9, to take action on a proposal to increase the capital stock from 310,000 shares, $100 par, to 1,000,000 shares divided into 500,000 shares no par common and 500,000 shares preferred, $100 par. The latter it proposes to reclassify into 80,547 shares of 6 per cent cumulative and 419,453 shares of 7 per cent cumulative. Present 6 per cent cumulative preferred may be exchanged share for share for the new 7 per cent preferred, while any of the 6 per cent preferred acquired by the company will also be converted into 7 per cent, and as such may be held, sold, or reissued by the company. The 7 per cent preferred will be redeemable at 115 and accrued dividends but will have no voting power unless there occurs a default in four quarterly dividend payments.

Traffic and Transportation

Forms Club

W. H. Sawyer Furthers Idea of Loyalty in East St. Louis by Grouping Old Employees Into Club

Ten employees who have served the East St. Louis & Suburban Railway for twenty-five years didn't give much thought to this distinction, so busy have they been in the performance of their duties during those years, but something happened a short time ago in East St. Louis and the men now feel that they are part and parcel of the progress and development of their city.

This is how it came about. W. H. Sawyer, president of the company, always interested in instilling loyalty and friendship into the men organized a group of his employees into what he terms the East St. Louis & Suburban Company Twenty-five-Year Club. The ten men who had served for that length of time were brought before Mr. Sawyer, made active members, dined as his guests and received checks from the company for $25 each. Before the big day celebration was over their chief had told the faithful ones that they were really selling a service; that they were indispensable to him and that next year at the annual dinner of the newly formed club he would expect them all to be present. When it was announced that honorary members could be elected, at the will of the active members, but that not more than one honorary member could be elected in one year, the men chose Mr. Sawyer. He at first objected on the ground that he had spent only four years at East St. Louis, but it was explained to him that the twenty-five-year clause was not binding on honorary members.

According to the rules and by-laws of the club active membership is to be limited to employees of the operating companies controlled by the East St. Louis & Suburban Company who have been in the employ continuously for twenty-five years or more. The membership is to be voluntary and there are to be no regular dues. It was agreed that members shall from time to time make such rules, elect such officers and hold such meetings as the majority desires with the exception that an annual meeting and dinner shall be held each year as close to May 18 as is practicable.

The object of the club is only another expression of Mr. Sawyer's idea of what an organization should be to its members. This club is to promote friendship, contentment and "firmly to unite those who, through many years of close personal and business relationship, have many mutual desires and interests."

After the dinner on May 18 each man was asked to tell what he was doing twenty-five years ago. One man told about his horse car experiences and another related how when operating one of the first electric cars he had had to hire a team of mules to have his car pulled back on the track. At length it was put up to Mr. Sawyer himself as to his doings a quarter of a century ago. He didn't stress difficulties with mules or horse cars, but merely said that he had got married. The men weren't satisfied with that as an answer (to the holders of twenty-five-year service records marriage is not a problem) and he had to tell some of his experiences as an electrical engineer for the General Electric Company.

Railway in Camden to Operate Buses

The Public Service Transportation Company, a subsidiary of the Public Service Corporation of New Jersey, will operate a fleet of modern buses on Kaighn Avenue and in the parkside district of Camden. At the same time, electric railway service on the present Kaighn Avenue line will be discontinued. The part of the route east of Kaighn Avenue is new and provides service to a district not before served. For a part of the distance, it runs along Forest Hill Park and in addition gives easy access to the Camden High and Junior High Schools.

The rate of fare will be 8 cents cash, with four tokens for 30 cents. Tokens sold by the Public Service Railway will be honored. Upon payment of 1 cent additional a transfer will be issued from the buses to cars of the intersecting lines of the Public Service Railway. Transfers will be issued by the railway to the buses at the same charge. Eight Model 50 White chassis, with Hoover bodies, will be operated.

Authorizes Bus Permits for Los Angeles Suburbs

After conducting various public hearings during the past thirty days based on applications of several bus line operators, the California State Railroad Commission has taken into consideration that there is a necessity of providing the fast-growing outlying district of Los Angeles with motor bus transportation service either by the auxiliaries of the street car lines or by privately operated bus systems; therefore, the commission on June 23 granted several motor bus certificates to furnish the desired service.

The permits authorize bus service to a portion of the San Fernando Valley; between Alhambra and South Pasadena and between Santa Monica and Venice.

At the same time the commission dismissed the application for bus line permits between Glendale, Hollywood and other points to Los Angeles.

Confidence Restored in San Diego

People of California City Know that Local Railway Always Had Best Interest of City in Mind

What caused the voters of San Diego, Calif., who last October refused by about 1,400 majority to relieve the railway of paving obligations, to reverse their position in five months' time and in March, this year, vote the asked relief by about the same majority? While many side lanes of local politics, ancient rancors and prejudices enter into the question, in the main the answer may be said to lie in two words—"fair play." And fair play is not a one-sided proposition; it applies both to the company and the public.

At the close of the war, the San Diego Electric Railway, like other railways, found its plant pretty much run down. Owing to lack of upkeep and peculiar local soil conditions, most of the roadbed was in a deplorable state. Rolling stock was in fair shape, but with such roadbeds, good service was impossible. This condition continued for some time after the war, and the people grumbled, and from a service standpoint, with justice. But what to do?

The company went before the State Railroad Commission, proposed and obtained a zone fare system which materially increased the average fare. And then, when public patience had almost reached a breaking point, came announcement from the company of an extensive rehabilitation program. This made the people feel better.

Meanwhile the company prepared a charter amendment empowering the Council to relieve it of paving obligations, and another to remove its affairs from the jurisdiction of the city and place it with the State Railroad Commission. It secured enough signers to compel the City Council to call a special election.

Old sores were ripped wide open again, however, in August, when the company, early one Sunday, tore out about a mile of the Adams Avenue line before the work was stopped by order of the Mayor. Anti-corporationists took advantage of the situation and blamed the company for all ills. Company officials asserted their action was necessary to protect themselves against an impending paving program of the City Council, charging bad faith on the part of the officials in not waiting until the paving amendment had been voted on by the people. The matter was taken to the courts, but agreement was finally reached, through mediation of the State Railroad Commission, and the company agreed to rebuild its tracks. In the meantime, however, patrons of the Adams Avenue route had to ride in buses, which didn't improve their state of mind any and probably lost many votes for the company's paving proposition.

In the October election the factors mitigating against the company's paving proposal were principally these:

Many people believed that the proposal was a loophole through which the company was seeking to escape its reconstruction program. Others mistrusted the proposed amendment because it was drawn by the company's attorneys. Others confused it with the proposal to remove the company from local jurisdiction to that of the State Railroad Commission, a proposal which was on the same ballot. Still others desired to punish the company for its stand in the Adams Avenue matter. And then there's always a percentage "agin' the corporations."

The result was that the paving amendment proposed by the company lost by a vote of 6,489 for and 8,952 against.

The company officials took the defeat philosophically and the reconstruction work went right ahead. Good service was installed on several of the more important lines in the city, car service was resumed on Adams Avenue, and all could see that the new type of track was substantial and enduring. Service was speeded up and there was shorter spacing between cars. Evidence that the company intended to keep its promises on the rebuilding program and the improved service put the car riding public into a more cheerful state of mind. The starting of the weekly pass system on Jan. 1 enhanced this feeling. All this was accompanied by judicious newspaper and folder publicity on the part of the company. All of the publicity emphasized the company's desire to serve and to make San Diego's "the best street car system in the United States."

The result was that in five months' time the people reversed their former verdict and freed the company of future paving obligations by a vote of 7,757 for and 6,374 against. The fact that the city attorney drew the amendment submitted at the spring election and that it was more detailed and therefore clearer to the average voter also probably operated to favor the company at the spring election. The voters were impressed with the company's "fair play" and also aimed to play fair.

Since that election the company has gained further good will by its announcement of the building of the Mission Beach line and the La Mesa line, and also just recently a line to La Jolla, so the relations between the company and the people at this time are very cordial. "Co-operation" is the watchword in San Diego just now, and it was emphasized recently by a speech by John D. Spreckels to more than 150 San Diego business men, when he, as head of the Spreckels interests, which include the San Diego Street Railway, pleaded for support for his plans to make San Diego a great city. Co-operation, he said, was all that was needed to put through a large development program, although most of the active work for the Spreckels companies would now devolve on his son Claus Spreckels. The senior Spreckels has been active head of the companies for thirty-six years, but he intimated he might soon retire.

Operation of One-Man Cars Still an Issue in Wisconsin

The litigation instituted by the city of Milwaukee to abolish one-man cars on the railway lines in Milwaukee will be advanced another step. It is now announced that the city will appeal to the Wisconsin Supreme Court from the recent decision of Judge E. Ray Stevens of the Dane County Circuit Court at Madison, who upheld the verdict of the Railroad Commission in its decision allowing the Milwaukee Northern Railway to continue the operation of one-man street cars in Milwaukee.

The city attorney says the commission has exceeded its powers granted by statute and that the decision as to the complement of a car crew in the city should be vested in its Common Council.

This new appeal will be in the form of a test case.

On May 22 the committee on recommendations of the Wisconsin Legislature recommended that the bill be killed which had been introduced by Senator J. J. Hirsch, Milwaukee, calling for the abolition of one-man cars from the streets of Milwaukee. After this action he offered an amendment providing that the authority for the operation of these cars should be vested with the Common Council. On May 24 the Hirsch bill was definitely killed by the Legislature.

Making Effective Jim Crow Provisions

Jim Crow provisions of the ordinance recently adopted by the City Commission of Birmingham effecting a settlement of all issues between the city and the Birmingham Railway, Light & Power Company, were put into effect on eighty-three cars of the company on July 1 and will be made effective on all cars within ten days. All provisions of the general settlement including regulations, which practically banned all jitneys from the streets, were to have become effective July 1, when a reduction in cash car fares from 8 to 7 cents and a reduction on tickets fares from 6⅔ to 6 cents was to be granted by the company. However, the enforcement of the jitney regulations has been held up by a temporary injunction granted by Judge William M. Walker in the Chancery division of the Circuit Court. Hearing on the injunction proceedings is set for July 11.

Under the terms of the agreement between the city and the Birmingham Railway, Light & Power Company and the receivers, the provisions of the settlement were not to take effect until the jitneys regulations were put into effect. However, the company is making the Jim Crow provisions of the ordinance effective at once. Boards separating the sections of the cars set apart for white and colored passengers, extending from the back of the seats to the top of the windows are being installed on all cars.

Jitney men have prepared and obtained signatures to a petition for an initiative election to submit a substitute ordinance prepared by the Jitney Owners and Operators' Association to the voters of the city. This petition it is stated probably will be filed with the secretary of the City Commission in a few days.

Ticket-Selling Plan Changed. — The Georgia Railway & Power Company, Atlanta, will start this month issuing tickets at three for 20 cents, it was announced by the company. Heretofore, tickets have been sold for the lines only in quantities of fifteen for $1. The fare in Atlanta is 7 cents.

One-Man Cars in Operation. — Five new one-man cars have been started on the Jule Street line of the St. Joseph Railway, Light, Heat & Power Company, and similar cars are to be put on the Frederick Avenue and Twenty-second Street lines. Twelve cars of this type have been completed by the American Car Company, St. Louis.

Obliges Patrons.—In response to public demand the Tri-City Railway, Davenport, Iowa, has issued a timetable of car schedules. It is in the form of a four-page booklet, which shows the time of departure of cars from the end of the lines, also the first car in the morning, the last regular car at night and the schedule of owl cars.

Fares Reduced.—A change in tariff has been filed with the Public Service Commission, effective July 22, 1923, by the International Railway whereby sixteen tickets good for transportation in either direction between Buffalo and Elwood will be sold for $2. Tickets will be good only on Buffalo-Lockport cars and not good as part payment of any through fare to a point beyond destination named in the ticket.

Arrangement Made for Letter Carriers.—A contract has been entered into between the Milwaukee post office and the Milwaukee Electric Railway & Light Company whereby all letter carriers of Milwaukee in the performance of duty only will be carried on the company's cars for $10,000 a year. Previous to this carriers have been allowed street car tickets for this purpose.

Heavy Bonds for Jitney Operators.—Jitney competition for the Georgia Railway & Power Company in Atlanta was eliminated when the City Council passed an ordinance requiring bus operators to post $5,000 indemnity bonds for the privilege of operating in Atlanta. President Preston S. Arkwright of the railway company states that with jitney competition now virtually eliminated by this new law the company will go ahead at once with an extensive construction and improvement program. Several hundred thousand dollars have already been invested this year in laying new tracks throughout the city, and the work is to be carried out through the rest of the year, Mr. Arkwright states. Operation of bus lines is one of the plans of the company.

Personal Items

New York Body Elects Mr. Duffey

President of Cortland County Traction Company Honored by New York Association at Bluff Point Meeting

Edwin Duffey, president of the Cortland County Traction Company, Cortland, N. Y., was elected president of the New York Electric Railway Association at the meeting at Bluff Point on June 23. In addition to being president of the railway, which post Mr. Duffey has held for about five years, he is a director of the National Bank of Cortland and a trustee of the Cortland Savings Bank. He was born at Buffalo, N. Y., March 14, 1868. When Mr. Duffey was an infant his parents removed to Middletown, N. Y., where they remained seven years. They then moved to Cortland, where Mr. Duffey has lived ever since. He was educated in the Cortland Normal School and was graduated from Amherst in 1890 with the degree of A. B. In 1893 he was graduated from Columbia Law School. He has since practiced law in Cortland. In 1897 he was elected district attorney and in 1915 was appointed Highway Commissioner of the State of New York, in which office he continued a little more than four years. Since retiring from that office he has been head of the traction company.

Edwin Duffey

William B. Mayo Heads Detroit Street Railways

William B. Mayo has accepted the appointment offered by Mayor Doremus of general manager of the Department of Street Railways, Detroit. Ross Schram will continue as assistant general manager. Mr. Mayo is the chief engineer of the Ford Motor Company and has been a member of the Street Railway Commission since his appointment by former Mayor Couzens when the commission was formed.

His connection with the Ford company will not be severed, but the major part of his time will be given to the railway problem. He is a "free lance" in the Ford organization and is free to devote as much time as necessary to the Detroit Railways.

Engineer and Securities Expert Joins Guaranty Company

Clarence E. Morrow, author of the article "Prospects for Electric Railway Financing in 1923," which appeared in the issue of the Electric Railway Journal for Jan. 6, 1923, page 24, has joined the Guaranty Company, New York, N. Y., in charge of the public utility bond division. He will be associated in negotiations for the purchase of public utility bonds which are underwritten by that company. Since 1921 Mr. Morrow has been connected with the corporation department of Merrill, Oldham & Company, investment bankers of Boston, examining and reporting on properties whose securities were handled by that organization. He was graduated from Whitman College in 1910 and from the Massachusetts Institute of Technology in 1912. Following his graduation at the institute he was an instructor there. For several years Mr. Morrow was chief draftsman with Stone & Webster, Boston, and later was engaged on appraisal and report work in connection with electric railway and electric light and power properties. The Guaranty Company, with which Mr. Morrow has now become connected, is affiliated with the Guaranty Trust Company, of which it is in fact the bond distributing department.

R. E. Skow is now chief engineer of the Lincoln (Neb.) Traction Company. In this position he succeeds J. M. Pawling.

R. M. Hanneford, assistant chief engineer of the Montreal Tramways, has been appointed acting chief engineer to succeed W. F. Graves, resigned.

C. J. Driscoll has replaced H. W. Reade as auditor of the Escanaba Power & Traction Company, Escanaba, Mich. Mr. Driscoll is also general freight and passenger agent.

C. W. Gifford, formerly general manager and purchasing agent of the Brockton & Plymouth Street Railway, Plymouth, Mass., has also been made vice-president.

William Rogers has succeeded Ralph Statler as chief engineer of the Mount Beacon (N. Y.) Association. This property operates 2,000 ft. of cable incline railway to the summit of Mount Beacon.

Mr. Cameron, Business Manager of the "Journal"

David Cameron has been appointed business manager of Electric Railway Journal and *Bus Transportation* effective July 1. He succeeds L. W. Seeligsberg, who has resigned to engage in advertising work for himself.

Having served in the field as a salesman on both papers for a number of years Mr. Cameron comes to the main office to take charge with a background of selling experience and a knowledge of conditions confronting the manufacturers serving both the railway and bus fields, which are believed to fit him eminently for his new position.

Mr. Cameron has been continuously with the McGraw-Hill Company and its predecessor the McGraw Publishing Company since his graduation from college in 1914. He started in as make-up man on Electric Railway Journal. After about a year he was transferred to the subscription department, where he served as assistant manager, working on all the McGraw publications. Then for about six months he did some special work for Mr. McGraw, which was terminated when he entered the army air service as a second lieutenant and pilot, serving in France for eight months.

David Cameron

When he received his discharge he came back with the company and was the Chicago district advertising manager of Electric Railway Journal. Later, with the establishment of *Bus Transportation*, he became the Cleveland district advertising manager for both Electric Railway Journal and *Bus Transportation*.

Mr. Cameron was born at Houtzdale, Pa., on Feb. 26, 1893. His early education was in the Wellsboro, Pa., High School, and he received his college training in Cornell University, University of Michigan and Dickinson College, Carlisle, Pa. He received his A. B. degree from Dickinson, where he was also elected to the honorary society Phi Beta Kappa.

Celebration for Mr. Hill's Ten Years Service in Elmira

Employees of a railway know that it isn't all sunshine for their general manager. This was evidenced in Elmira recently, when the forces of the Elmira Water, Light & Railroad Company expressed their appreciation of Frederick H. Hill's cordial relations with them in the ten years service he has given the company. Attorney Halsey Sayles, legal representative of the company for approximately twenty-five years, in behalf of the 300 employees presented a solid silver service to Mr. Hill. The celebration took place at Rorick's Glen dancing pavilion, where a dinner was served, followed by dancing.

It was on May 12, 1913, that Mr. Hill became identified with the Elmira property as chief engineer. A short time later he was promoted to the position of general manager to succeed H. M. Beardsley, resigned. Later Mr. Hill was elected vice-president and today he is serving in that capacity as well as general manager. The Elmira newspapers, too, commented favorably on Mr. Hill's accomplishments, declaring that the unexcelled car service, the modern artificial gas plant and a satisfactory electric light and power service were all achievements of the corporation under Mr. Hill's supervision.

J. C. Bennett Elected Director of Westinghouse Electric

James C. Bennett, comptroller of the Westinghouse Electric & Manufacturing Company, has been elected a director of the company to succeed John R. McCune, who died on May 14.

Mr. Bennett entered the employ of the company almost immediately after graduation from high school in 1886 as assistant to the auditor. Inasmuch as the company had been founded only five months prior to this time, he is one of its oldest employees. Mr. Bennett is also an officer and director of a number of the Westinghouse subsidiary companies.

Mr. Dickson in Providence

E. J. Dickson, formerly vice-president in charge of operation of the International Railway, Buffalo, N. Y., has been elected vice-president of the United Electric Railways, Providence, R. I. He entered upon his new duties on July 1.

A. W. Loasby Made President of Equitable Trust

Arthur W. Loasby, senior vice-president of the Equitable Trust Company, New York, was elected president of that institution on June 26. He entered upon his new duties on July 1, when Alvin W. Krech, president of the Equitable for practically twenty years, retired to become chairman of the board.

Mr. Loasby is well known to electric railway executives throughout New York State, particularly those in Central New York. He played a large part in the reorganization of some of the interurban railways operating out of Syracuse, and previous to accepting appointment to the Equitable Trust Company he was president of the Auburn & Syracuse Electric Railroad and the Rochester & Syracuse Railroad.

Mr. Loasby entered the banking businedd in Syracuse at the age of twenty years when he became identified with the First National Bank of that city. It was not long before his aggressiveness and ability carried him into a vice-presidency of that institution. Subsequently he became president of the Trust & Deposit Company of Syracuse. Later he accomplished a consolidation of those two companies and became the head of the merged institution. He joined the Equitable Trust Company about two years ago.

C. E. Warwick on Leave of Absence

C. E. Warwick, superintendent of the railway lines of the Wisconsin Public Service Corporation, has been granted a leave of absence in the hope of improving his health.

C. H. Allen has been appointed acting superintendent of railways of the company and will be in complete charge of that department pending the return of Mr. Warwick.

E. M. Lunda has been appointed master mechanic in charge of the repair shops and railway equipment of the company.

Allan Cunningham has succeeded L. E. Flint as assistant treasurer of the Manchester Traction, Light & Power Company, Manchester, N. H.

C. D. Vail, railroad and hydraulic expert for the Colorado Public Utilities Commission, has been appointed a member of the commission to fill temporarily the place of Judge Tully Scott, who is ill and unable to perform the duties of his office.

J. T. Hambleton of Pen Argyl, Pa., has been appointed general manager of the Hartford & Springfield Street Railway Company, beginning July 5. Mr. Hambleton succeeds William W. Walker, who resigned to become manager of the Shore Line Electric Company.

George E. Cockings, manager of the Bristol & Plainville Electric Company, Bristol, Conn., formerly the Bristol & Plainville Tramway, has been elected president of the Tenney Service Association, an organization of leading men in the utilities managed by Charles H. Tenney & Company, Boston. For the past twenty-seven years Mr. Cockings has been manager of the electric railway, gas and electric properties at Bristol. The company at Bristol does a combined railway and lighting business. The railway line is about 14 miles long. The general managers are Charles H. Tenney & Company.

Levick P. Miles of Memphis, prominent in electric railway legal circles, was honored by an election as vice-president of the Tennessee Bar Association for West Tennessee at its recent annual meeting held in Nashville.

Major William H. Holcombe, Corps of Engineers, has been detailed as assistant engineer commissioner of the District of Columbia. Major Frank S. Besson will continue to serve as acting engineer commissioner until a successor to Col. Charles Keller is named.

M. Bernard, at one time assistant engineer in the way and structures department of the Brooklyn Rapid Transit Company and more recently office engineer in connection with the construction of tracks for the city of Detroit, is now associated with the Engineering Service Bureau, Tribune Building, New York City.

Frank B. Faris, former attorney-examiner for the Public Service Commission of Indiana and recently associated with the law firm of Haynes & Mote, has entered the general practice of law at Indianapolis under his own name, devoting himself particularly to rate, securities, valuation, tax and other matters affecting public utilities before regulatory boards, commissions and the courts.

H. S. Cooper, well known utility official of Texas, has been chosen city manager of the municipality of Highland Park, a suburb of Dallas, Tex., which maintains a separate government. Mr. Cooper has been in Dallas for a number of years. He was formerly secretary of the Southwest Gas & Electric Association. Prior to coming to Dallas he was general manager of the Galveston Electric Company, a Stone & Webster property that operates the railway lines in Galveston.

Charles G. Blakeslee of Binghamton has been appointed by the Public Service Commission of New York State as counsel to the commission, succeeding Ledyard P. Hale, whose resignation takes effect on June 30 after a continuous service as counsel since the establishment of the Public Service Commission in 1907. Mr. Blakeslee was appointed a member of the Public Service Commission on April 25, 1921, by Governor Miller, his term expiring early this year, when he was succeeded by James A. Parsons of Hornell.

Philip O. Geier, treasurer of the Cincinnati Milling Machine Company, has been appointed to fill the vacancy caused by the death of Judge W. A. Geoghegan on the Cincinnati Rapid Transit Commission. The appointment was made by Mayor George P. Carrol. Mr. Geier was strongly indorsed by the business men of the city. He will serve the balance of the term of Judge Geoghegan, which runs until Nov. 15, 1928. Mr. Geier is prominent in local business and civic circles. He is a director of the Business Men's Club and the Cincinnati Fall Festival Association.

Obituary

P. N. Jones

P. N. Jones, general manager of the Pittsburgh Railways, died suddenly on July 1 in a Lancaster, Pa., hotel in which he had stopped while en route through the East on an automobile trip with Mrs. Jones and his daughter. The party left the Jones residence the previous Friday evening. Mr. Jones was then apparently in good health. Acute dilation of the heart was given as the cause of death.

Mr. Jones always approached the problems of management from their engineering side. This was quite logical, because first of all he was an engineer. Thus there grew out of the studies of railway operating problems which Mr. Jones made in Pittsburgh and other cities a series of developments embodying many patentable ideas suitable for general application. The creative work of the man really was prolific, so that it is impossible here to do more than merely mention some of the outstanding developments of the railway art for which he was responsible.

Perhaps his most important contribution to the science was the so-called baby motor. The tendency toward lighter weight in car construction set in about 1912. Mr. Jones was one of the first to discern this need under the changing economic status of the industry. Already an advocate of the low-floor car, which had its real inception in 1910 in center-entrance trail cars in Pittsburgh with 22-in. wheels, he found the low-floor car advantageous for all-around application, but impossible of adoption in hilly Pittsburgh with the usual motor equipment. The heavy grades and the severe schedules necessitated the application of a considerable amount of power, notwithstanding the light weight of the proposed car, and even with four motors the minimum motor size that was considered feasible was 30-35 hp.

Unfortunately no existing motors in this capacity could be mounted on axles with 22-in. wheels and give sufficient clearance. Although there was some skepticism as to the possibilities, both commercial and operative, about the prospects of a motor of the required dimensions, the development of a new design was undertaken for the Pittsburgh Railways and carried to perfection under the direction of Mr. Jones. A new method of remote control adapted to these cars also stands to his credit. He was also responsible for the design of a new type of sliding and rolling car door. Quick to discern the advantages of the application of new methods to old problems, Mr. Jones was one of the first to introduce parallel operation first of d.c. railway generating stations and then of a.c. stations.

Mr. Jones was able to apply to the problems that confronted him experience dating back to the early days of the electric railway when he became a shop apprentice in the construction department of the Short Electric Railway Company, Cleveland, manufacturers of the Short electric railway motors. He remained with that company until it was absorbed by the General Electric Company, when he became identified with the Lincoln Electric Company in experimental work. In May, 1894, he entered the testing department of the Westinghouse Electric & Manufacturing Company at Pittsburgh and was made superintendent of city construction in Pittsburgh.

On Jan. 1, 1903, Mr. Jones became manager of the Cleveland sales office and April 1, 1903, he became sales manager at Pittsburgh. Oct. 1, 1905, he resigned to become electrical and mechanical engineer of the Pittsburgh Railways. He was advanced to general superintendent in 1909 and to general manager in 1912, the additional duties of second vice-president being assumed later.

P. N. Jones

Mr. Jones was born near Springfield, Ohio, in 1865. He was educated in the public schools and was graduated from Ohio State University in 1892 as a mechanical and electrical engineer.

He was a member of the American Electric Railway Association, Engineers' Society of Western Pennsylvania, the American Institute of Electrical Engineers and the Pennsylvania Street Railway Association.

F. W. Brooks

Frank W. Brooks, former president of the Detroit United Railway, died in Detroit on June 28 following an extended illness. Mr. Brooks retired from the company at Detroit in 1921. He had not been well for a long time then, but continued in his post at the head of the company because of the need that was felt by his associates of his help and advice at that critical time in the affairs of the company just prior to the city taking over the local lines. The disposition has been quite general since the advent of municipal ownership in Detroit to criticise the former management of the D. U. R., and to charge that the attitude of the officials toward the problem there only served to intensify the feeling against the company. That is something of which it is not easy to judge. It is quite certain, however, that few men can be found anywhere who carried out the trust placed in them more faithfully than did Frank Brooks or at greater personal sacrifice than he. In the last analysis that is the real measure of any man.

The career of Mr. Brooks is virtually the history of interurban railway development, especially in the vicinity of Detroit. Mr. Brooks was born in Waco, Texas, March 4, 1865. He was educated in private schools in Waco and was graduated from the Texas State College, where he specialized in engineering. In 1882 he became identified with the construction of the New Orleans & Texas Pacific Railway. In succession he followed his chosen engineering work with the Queen & Crescent Railway and the Illinois Central system.

From steam roads Mr. Brooks turned to the field of electric railway construction and operation in 1895, when he became general manager of the Rapid Railway at Detroit, then under construction and one of the first lines in the country to develop the use of the trolley for the delivery of freight and mail as well as to carry passengers between the adjoining communities.

When the Rapid Railway, through financial negotiations, passed into the control of the Detroit United Railway in 1903 Mr. Brooks was made assistant general manager. Within a short time he relieved Jere C. Hutchins, at that time president, of the detail work of general manager. In February, 1916, Mr. Brooks was elected one of the vice-presidents of the company. In June, 1916, he was made president following the retirement of Mr. Hutchins to become chairman of the board of directors.

F. M. Weld

F. M. Weld, master mechanic of the department of street railways, city of Detroit, died on June 22. Mr. Weld was fifty-four years of age.

Mr. Weld was well known to electric railway mechanical men throughout the entire country, but particularly to electric railway operators in Massachusetts, where he began his railway career in 1901 with the Wakefield & Stoneham Street Railway. By far the largest part of his career was in New England, but he served on several Indiana properties and at Birmingham, Ala., as master mechanic.

John A. Britton

John Alexander Britton, nationally prominent in the electric light and power field and vice-president and general manager of the Pacific Gas & Electric Company, died in San Francisco on June 29, after a short illness, at the age of sixty-eight. At the recent convention of the National Electric Light Association Mr. Britton had been elected first vice-president. As an executive engineer Mr. Britton did some notable work. He was a member of the American Society of Mechanical Engineers, American Society of Civil Engineers as well as of the American Institute of Electrical Engineers.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Four-Motor Equipment Favored

Development of Low-Floor Car and Need for Rapid Acceleration Increase Popularity of Quadruple Equipment

A study of recent purchases of cars shows that a number of railways which formerly operated two-motor cars are now buying four-motor cars. Increasing traffic congestion and the necessity for rapid acceleration, coupled with the development of the low-floor car, have been important factors in creating this changed sentiment, manufacturers say.

Among the companies which have previously used two-motor equipment and are now buying four-motor equipment is the United Railways of St. Louis. This company's most recent cars are equipped with four motors of 25 hp. to 35 hp. each. The Los Angeles Railway, which in the past has used two-motor equipment, is now buying quadruple equipment. The reasons there are, primarily, the necessity of making more stops and at the same time increasing the scheduled speed. Another factor which no doubt has influenced the Los Angeles Railway is the narrow gage of its track, which is only 3 ft. 6 in. The Chicago Surface Lines recently purchased a large number of quadruple equipments for heavy cars, and at the same time a number of double equipments with the same type motor for use on light-weight cars. Had it not been for the desire to use the same type motor on both lots of cars, the light-weight cars would probably have been equipped with four motors.

Other railways which have in the past operated many two-motor cars and which now appear to favor the four-motor type include the Boston Elevated Railway, where all recent purchases for surface cars have been quadruple equipment of 25 hp. and 40 hp. capacity; the Capital Traction Company, Washington, D. C.; the Houston Electric Company, which has recently purchased quadruple equipment of 35-hp. motors; the Louisville Railway; the Milwaukee Electric Railway & Light Company, and the Cincinnati Traction Company.

In the South, where climatic conditions are particularly favorable to the use of two-motor cars, there appears to be nevertheless some tendency toward the use of quadruple equipment. Besides the Houston Electric Company, already mentioned, several other companies have recently bought quadruple equipment of 35-hp. motors. Among these are the Georgia Railway & Power Company, Atlanta, Ga.; the Birmingham Railway, Light & Power Company, and the Memphis Street Railway.

Aside from the question of traffic and the need for rapid acceleration there is room for argument concerning the relative economy of two-motor and four-motor equipment. Theoretically the energy consumption of two large motors is less than that of four small motors, because in the former case larger and more efficient machines are involved. The maintenance of the two-motor equipment should cost less than that of the four-motor equipment, because only one-half of the number of motors are in service, and part of the maintenance expense is nearly independent of the size of the motor. However, some railway operators seem to feel that these theoretical advantages are outweighed by the waste of energy caused by the greater slipping of wheels.

Copper Unlikely to Go Lower

The price of copper in the open market today is little higher than it was before the war. While the price of most articles has increased tremendously, copper has made no permanent advance. This is fundamentally an unsound condition, manufacturers say, because the cost of mining and refining has increased in conformity with the increased cost of manufacture in other lines. The present market price, therefore, means that copper is being sold at less than true cost. The reason for this is easy to understand, when it is remembered that it costs hundreds of thousands of dollars per month to keep the plants in condition, even though they are not working. Manufacturers, therefore, prefer to sell their product at a slight loss than to have their plants idle. Obviously, however, this situation cannot be maintained indefinitely. The price of copper therefore seems destined to go higher rather than drop lower.

The improved financial condition of Europe is beginning to result in the purchase of more copper from the United States. This process will probably be gradual and a long time may elapse before our copper export amounts to as much as it used to before the war. At the same time, the use of copper for domestic purposes is also increasing. It is being used in many places where other metals previously were in use. Ultimately, therefore, the combined domestic and export market may be greater than it was in 1914. This will not necessarily boost the price of copper, manufacturers say, because the production capacity in the United States is considerably greater than the present demand. During the war we were able to increase our production approximately 40 per cent. This increase is not now being used, and there is, therefore, a leeway between present demand and ultimate production capacity that will prevent any real shortage. However, a period of approximately three months is required between the mining of the copper and its appearance on the market, so if there should be any sudden wave of buying the price might be temporarily driven upward.

ELECTRIC RAILWAY MATERIAL PRICES—JULY 3, 1923

Metals—New York

Copper, electrolytic, cents per lb.	14.50
Lead, cents per lb.	6.50
Nickel, cents per lb.	29.50
Zinc, cents per lb.	6.10
Tin Straits, cents per lb.	37.75
Aluminum, 98 to 99 per cent, cents per lb.	25.50
Babbitt metal, warehouse, cents per lb.:	
Fair grade	56.00
Commercial	30.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads	$5.625
Somerset mine run, Boston	2.625
Pittsburgh mine run, Pittsburgh	2.05
Franklin, Ill., screenings, Chicago	1.675
Central, Ill., screenings, Chicago	1.375
Kansas screenings, Kansas City	2.625

Track Materials—Pittsburgh

Standard Bessemer steel rails, gross ton	$43.00
Standard open hearth rails, gross ton	43.00
Railroad spikes, drive, Pittsburgh base, cents per lb.	3.15
Tie plates (flat type), cents per lb.	2.575
Angle bars, cents per lb.	2.75
Rail bolts and nuts, Pittsburgh base, cents, lb.	4.125
Steel bars, cents per lb.	2.40
Ties, white oak, Chicago, 6 in.x8 in.x8½ ft.	$1.50

Hardware—Pittsburgh

Wire nails, base per keg	3.00
Sheet iron (28 gage), cents per lb.	3.85
Sheet iron, galvanized (28 gage), cents per lb.	5.00
Galvanized barbed wire, cents per lb.	3.80
Galvanized wire, ordinary, cents per lb.	3.35

Waste—New York

Waste, wool, cents per lb.	12–16
Waste, cotton (100 lb. bale), cents per lb.:	
White	11–13.50
Colored	8–13

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), per gal.	$1.11
White lead (100 lb. keg), cents per lb.	12.625
Turpentine (bbl. lots), per gal.	$0.93
Car window glass, (single strength), first three brackets, A quality, discount*	84.0%
Car window glass, (single strength), first three brackets, B quality, discount*	86.0%
Car window glass, (double strength) all sizes, A quality, discount*	85.0%
Putty, 100 lb. tins, cents per lb.	4.75

*These prices are f.o.b. works, boxing charges extra.

Wire—New York

Copper wire base, cents per lb.	18.00
Rubber-covered wire, No. 14, per 1,000 ft.	$7.45
Weatherproof wire base, cents per lb.	18.50

Paving Materials

Paving stone, granite, 4x8x4, f.o.b.	
Chicago, dressed, per sq.yd.	$3.50
Common, per sq.yd.	3.10
Wood block paving 3½, 16 treatment, N. Y., per sq.yd.	2.75
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots	54.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd.	1.75
Cement, Chicago consumers net prices, without bags	2.20
Gravel, ¾-in., cu.yd., N. Y.	2.25
Sand, cu.yd., N. Y.	1.25

Old Metals—New York

Heavy copper, cents per lb.	11.50
Light copper, cents per lb.	9.50
Heavy brass, cents per lb.	5.00
Zinc, old scrap, cents per lb.	4.00
Yellow brass, cents per lb. (heavy)	6.00
Lead, heavy, cents per lb.	5.25
Steel car axles, Chicago, net ton	$20.25
Old car wheels, Chicago, gross ton	21.25
Rails (short), Chicago, gross ton	22.25
Rails, (relaying), Chicago, gross ton	33.50
Machine turnings, Chicago, net ton	10.25

Rolling Stock

Twin State Gas & Electric Company, Brattleboro, Vt., has ordered three buses costing about $6,500, with a view to putting these into operation on Aug. 1 in place of the railway system.

Southwestern Traction Company, Temple, Tex., suffered the loss of two cars by fire when lightning struck the power house and carhouse located between Belton and Temple. Besides the two cars the fire consumed the repair shops, carhouse and welding plant.

Brooklyn City Railroad, New York, N. Y., has ordered 200 four-motor passenger cars. They will be of the one-man, two-man type, arranged for double-end operation, with front entrance and center exit, the conductor to be located in the center well. They will be 44 ft. long, will seat fifty-three passengers and have an approximate weight of 38,000 lb. They will be fully equipped with Safety Car Devices Company devices and will also be provided with Westinghouse Traction Company variable load brakes. Of these cars 100 will be built by the St. Louis Car Company and 100 by the J. G. Brill Company in Philadelphia. All of the trucks will be furnished by Brill. The Westinghouse and General Electric will each supply 400 motors of 35 hp. capacity. The gears furnished are to be such that they will be completely interchangeable between the two types of motors. All the exterior sheeting is to be .025 copper bearing steel as a rust-resisting material. Delivery is expected in the early autumn. The detailed specifications of the equipment are as follows:

Bolster centers, length	21 ft. 6 in.
Length over all	44 ft.
Truck wheelbase	5 ft. 4 in.
Width over all	8 ft. 3 in.
Height, rail to trolley base	10 ft. 9 13/16 in.
Body	Steel
Interior trim	Mahogany
Headlining	Agasote and Nevasplit
Roof	Arch
Armature bearings	Plain
Axles	Heat treated
Bumpers	7-in. Hedley
Signals	Consolidated Car Heating Company
Car trimmings	Statuary bronze
Center and side bearings	Brill oil retaining
Conduits and junction boxes	Crouse-Hinds
Control	K-72-A
Couplers	Emergency only
Curtain fixtures	Crown
Curtain material	Pantasote
Designation signs	Hunter Illuminated
Door operating mechanism	Consolidated Car Heating Company
Fare boxes	Brooklyn Elec. Registering Coin Box
Fenders	Root Spring Scraper Company
Gears and pinions	G.E. Grade M. West. Grade BP
Hand brakes	Peacock Staffless
Heater equipment	Gold Electric
Headlights	Crouse-Hinds Type ZP
Journal bearings	A. E. R. A.
Journal boxes	Brill
Lightning arresters	West. MP and G.E.
Motors	West.-510, G.E.-265
Motors	Inside hung
Registers	International solenoid operated
Sanders	Ohio Brass
Sash fixtures	O. M. Edwards
Seats	Reversible
Seating material	Cherry slat
Slack adjuster	American Brake Company Type J
Springs	Brill
Step treads	Feralun
Trolley catchers or retrievers	Ohio Brass Form M-1
Trolley base	Ohio Brass Form M-1
Trolley wheels or shoes	5-in. wheel
Trucks	Brill 77-E-1
Ventilators	Utility Honeycomb
Wheels	26-in. rolled steel
Lighting fixtures	Dayton Manufacturing Company

In addition to the above motor cars the Brooklyn City Railroad some time ago placed an order with the Westinghouse Company for motors to equip fifty-four existing center entrance trailers built in 1919 and seating sixty-two passengers. The details as to the equipment for converting these cars into double-end motor cars are:

Motors	Two Westinghouse 535-A per car
Trucks	Brill 62-E-1
Control	Westinghouse K-68-A
Air brakes	G.E. Comp. CP-27-B
Fenders	Root Spring Scraper Company
Hank brakes	Peacock Staffless
Trolley bases	U. S.-11
Trolley catchers	Ohio Brass
Lightning arresters	West. Type MP
Registers	International solenoid operated

Track and Line

Madison Street Railway has begun the work of doubling its track on East Johnson Street. New ties, ballast and rail will be installed.

Fort William Electric Street Railway, Fort William, Ont., expects to electrify 5 miles of steam railway. The company announces that it will be in the market for bonding material, trolley and feed wire, crossarms and brackets, etc.

Kentucky Traction & Terminal Company, Lexington, Ky., is installing for the new light-weight one-man city cars ordered in January new passing sidings, two new turning point wyes. The material was contracted for and received.

Southern Public Utilities Company, Charlotte, N. C., will spend $18,000 for track work. The program in accordance with the city paving plan will mean the rebuilding and paving of nine blocks of track. The first three blocks of this paving have been completed.

Abilene Street Railway is building a line to McMurray College, a new educational institution established by the Methodist Church on the outskirts of the city of Abilene. The new line will be about 1 mile long and will be ready for operation by next September.

Power Houses, Shops and Buildings

Milwaukee Northern Railway, Cedarburg, Wis., expects to erect in the near future an adequate passenger station in Sheboygan.

Milwaukee Electric Railway & Light Company suffered the loss of electrical equipment and other supplies valued at not more than $40,000 when the public service building caught fire on June 27. Damage to the building amounted to about $75,000, covered by insurance.

New Jersey & Pennsylvania Traction Company, Trenton, N. J., has abandoned its power station at Yardley, Pa., and is now purchasing current from the Phoenixville, Pa., Electric Company. The current is being sent more than 40 miles to the New Jersey territory. The company will continue to maintain its substations and will keep the plant at Yardley for emergency purposes.

Trenton & Mercer County Traction Corporation, Trenton, N. J., has purchased a large plot of ground on Perry Street, near the center of the city, and will erect a terminal on the site. It is the plan of the company to build a modern terminal, one which will be used not only for the housing of suburban cars, but for transfer points and as a central office for the company. If the company is granted a franchise by the city to operate buses the site will also be used as a terminal for bus routes and as a storage yard for cars for emergency service. The proposed bus service is to be established by the Central Transportation Company.

Trade Notes

George H. Hawley has been appointed manager of the metal departments of the Standard Underground Cable Company's Perth Amboy, N. J., works, to fill the vacany caused by the death of C. C. Baldwin. Mr. Hawley has been production manager for the past three years of the departments in question, which include the melting furnaces, rod, wire brass and tube mills, and those for the manufacture of weatherproof and magnet wire. He has had an unusually wide experience in such work and before going with the Standard company was connected with the National Conduit & Cable Company at Hastings-on-the-Hudson, and for many years prior with the American Brass Company at Ansonia.

Mamolith Carbon Paint Company, Cincinnati, Ohio, has been sold to J. H. Kresge, president of the Kresge Coal & Mining Company, Pittston, Pa. The sale, which involves approximately $300,000, includes the plant, equipment, paint formulas and carbon mines of the company in Arkansas. At present the company is incorporated under the laws of Missouri with a capital of $200,000. The Missouri charter will be surrendered by the new owners and the company incorporated under the laws of Ohio with a capitalization of $500,000. Mr. Kresge will be president, Mr. Dresbach treasurer and Mr. Clements vice-president and general manager.

New Advertising Literature

Combustion Engineering Company has published a folder describing the type K stokers for operating boilers ranging up to 200 hp.

A. Gilbert & Sons Brass Foundry Company, St. Louis, Mo., has just issued a new catalog descriptive of Gilbert's electric railway specialties for motors, overhead line material, steam locomotives and cars. This includes such parts as trolley wheels, armatures and axle bearings and brasses, babbitt and anti-friction bearing metals, trolley frogs, ears and splicers.

The function of the "automatic stop"

is properly to limit chain release

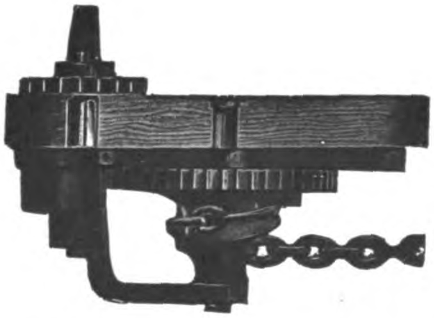
Peacock Brake action is fully safeguarded

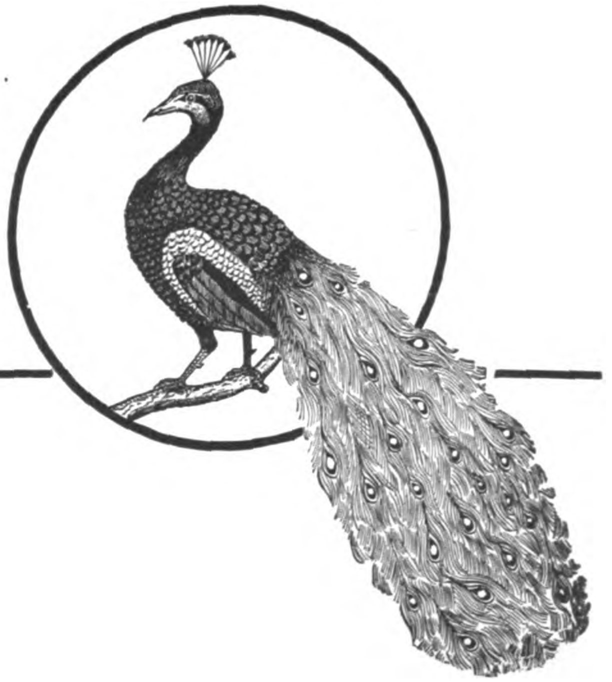
On the principle that "more than enough is too much," Peacock Improved Brakes are all equipped with an *automatic stop* device which prevents the chain from unwinding beyond the point of full release. Anything more than that means extra chain to wind up on the next application of brakes, and that means seconds wasted. Peacock Brakes save those seconds.

This automatic stop is only one of the *seconds-saving* features of Peacock Improved Brakes. Their whole design is based on speed of application, plus maximum braking power when applied. The characteristic eccentric drum construction illustrated below combines speed and power in a manner which is exclusively "Peacock."

The question of cost

Is answered by the maintenance savings. Ask us to give you figures on installation costs and savings you can expect.





National Brake Company, Inc.
890 Ellicott Square
Buffalo, N. Y.
Canadian Representative:
Lyman Tube & Supply Company, Limited
Montreal, Canada

Bankers and Engineers

Ford, Bacon & Davis

Incorporated

Business Established 1894

115 BROADWAY, New York

PHILADELPHIA CHICAGO SAN FRANCISCO

STONE & WEBSTER

Incorporated

EXAMINATIONS REPORTS APPRAISALS
ON
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NEW YORK BOSTON CHICAGO

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ENGINEERS

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HYDRO-ELECTRIC DEVELOPMENTS

RAILWAY, LIGHT and POWER PROPERTIES

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ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL
105 South La Salle Street
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ALBERT S. RICHEY

ELECTRIC RAILWAY ENGINEER
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REPORTS—APPRAISALS—RATES—OPERATION—SERVICE

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Specializing in Utility Rate Cases and Reports to Bankers and Investors

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Design and Construction of Power Stations
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VALUATION AND FINANCIAL REPORTS
RATE STUDIES FOR PRESENTATION TO PUBLIC SERVICE COMMISSIONS
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Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation

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***Consultant on* Fares, Buses, Motor Trucks**

Originator of unlimited ride, transferable weekly pass. Campaigns handled to make it a success.

143 Crary Ave., Mt. Vernon, N. Y.

The Most Successful Men in the Electric Railway Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

Dwight P. Robinson & Company
Incorporated
Design and Construction of
Electric Railways, Shops, Power Stations
125 East 46th Street, New York
Chicago Youngstown Montreal
Philadelphia Los Angeles Rio de Janeiro

J. ROWLAND BIBBINS
Engineer—921 Fifteenth St., WASHINGTON, D. C.
TRANSPORTATION
Complete Transit Surveys and Development Programs, adapting Motor-Transport, R.R. Terminal and City Plans. Traffic, Service, Routing, Operation and Valuation. EXPERIENCE IN 20 CITIES

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WM. BARCLAY PARSONS H. M. BRINKERHOFF
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Engineers—Constructors—Managers
Hydro-electric Railway Light and Industrial Plants
Appraisals and Reports
CLEVELAND NEW YORK
1570 Hanna Bldg. 84 Pine St.

Transmission Line and Special Crossing Structures, Catenary Bridges
WRITE FOR OUR NEW DESCRIPTIVE CATALOG
ARCHBOLD-BRADY CO.
Engineers and Contractors SYRACUSE, N. Y.

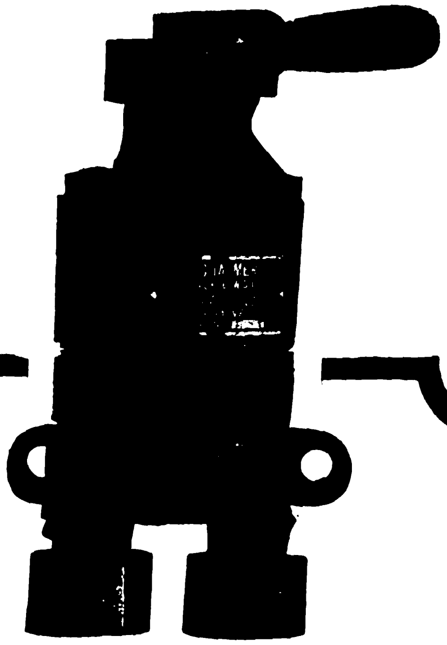
DAY & ZIMMERMANN, INC.
ENGINEERS
Design, Construction
Reports, Valuations, Management
NEW YORK PHILADELPHIA CHICAGO

EDWIN WORTHAM, E.E.
Consulting Engineer
Valuations of Electric Railways and Utilities of All Kinds
Traffic and Operating Studies
Allison Bldg. **Richmond, Va.**
Established Feb. 1913.

THE SEARCHLIGHT SECTION
will find The man / The position / The plant *you want*
Put your ad in the Searchlight

THE P. EDWARD WISH SERVICE
50 Church St. *Street Railway Inspection* 131 State St.
NEW YORK DETECTIVES BOSTON

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.



ALLIS-CHALMERS

Type "C"

Engineers Valves for Air Brakes

This engineers valve has been adopted by many important railways as STANDARD, regardless of the other equipment used. Several years of commercial application has demonstrated type "C" Engineer's Valve to be superior in every respect. A few important features are graduated application positively secured at service point—quick emergency point—graduated release, if desired—very quick release at full release point—no ground joints—simple design—valve can be completely dismantled and reassembled in two minutes by removing only two nuts—etc., etc.

500,000 service applications and releases at 90 lbs. pressure show no wear on the parts.

Send for Bulletin No. 1103A.

ALLIS-CHALMERS
MANUFACTURING COMPANY
MILWAUKEE, WISCONSIN. U.S.A.

Report of Investigation of

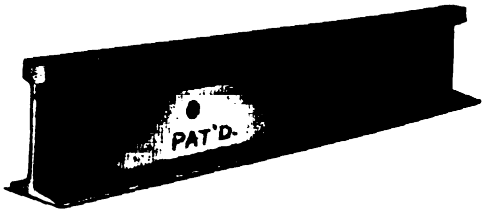
"INDIANAPOLIS"

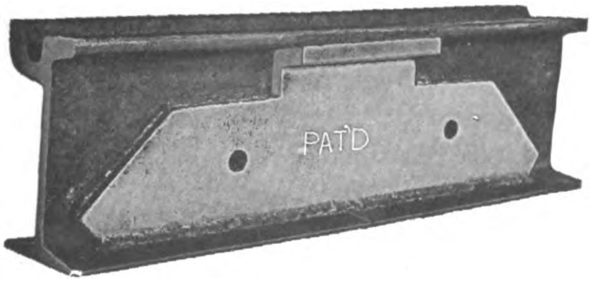
Type of Welded Rail Joints

They Meet All Requirements

To Wit as Follows:

1. **Conductivity**—138%—United States Bureau of Standard Test.
2. **Strength**—Over 100% — Robert W. Hunt & Co., Testing Laboratories.
3. **Endurance**—11 years in Service—Still Intact.
4. **Dependable**—Less than 1% Failure. When installed as directed by manufacturer.
5. **Economical**—Cost Less Than Bolted and Bonded Joints.
6. **Available**—Any road. Any quantity — from One (1) to Ten Thousand (10,000).
7. **Universal**—In use on over 125 Different Rail Sections.
8. **Endorsed**—In use on over 200 properties.





WHY?

Because —

They are Scientifically Designed
A Special Product for a
Specific Purpose

Completely and Perfectly Effecting the
"CONTINUOUS RAIL"

"Perfection in Principle Proven
in Performance"

The Indianapolis Switch & Frog Co.

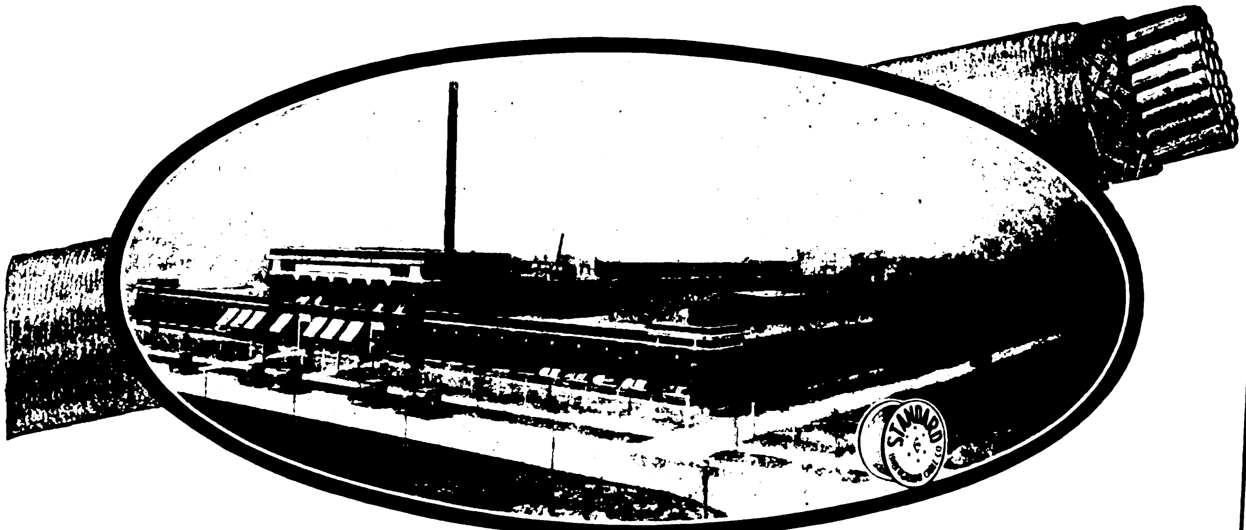
SPRINGFIELD, OHIO

J. J. Costello Boston, Mass. New England Representative

MONEY SAVED
BY SHORT HAUL

TIME SAVED
IN EMERGENCIES

An Exceptional Service to the West and Southwest from Our New and Complete St. Louis Factory



MAIN BUILDING: 560 BY 320 FEET. ROD MILL SHOWN JUST WEST OF MAIN BUILDING

BUYERS in the West and Southwest:—You are now offered exceptional facilities for meeting your requirements of bare and insulated electric wires and cables promptly and economically.

The new STANDARD factory in St. Louis, with its over 180,000 square feet of floor space, complete with the latest improved and most efficient machinery, is at your service. Every operation in the manufacture of STANDARD Wires and Cables, from copper wire bar to finished product, is performed in this new plant.

This new production capacity, added to the greatly increased facilities afforded by our new Pittsburgh plant and enlarged Perth Amboy, N. J. plant, enables us to insure to all our customers a standard of quality and service which is higher than ever.

Write our nearest office about your requirements.

Standard Underground Cable Co.

BOSTON PHILADELPHIA ATLANTA CHICAGO KANSAS CITY LOS ANGELES
NEW YORK WASHINGTON PITTSBURGH DETROIT ST. LOUIS SEATTLE SAN FRANCISCO
FACTORIES: PERTH AMBOY, N. J. PITTSBURGH, PA. ST. LOUIS, MO. OAKLAND, CALIF.
FOR CANADA: STANDARD UNDERGROUND CABLE CO., OF CANADA LTD., HAMILTON, ONT.

Laying Resilient ties in con
traffic and without temporary
crossovers

HOTEL NATIONAL
HIGH SPEED GASOLINE

DAYTON

crete *without interruption to*

Think of having a permanent, easy-riding track on a permanent concrete foundation without interrupting service during construction and without the expense of temporary crossovers.

On the page opposite are shown city and interurban cars operating on a five- and thirty-minute headway, respectively, while dry concrete is being tamped under the ties.

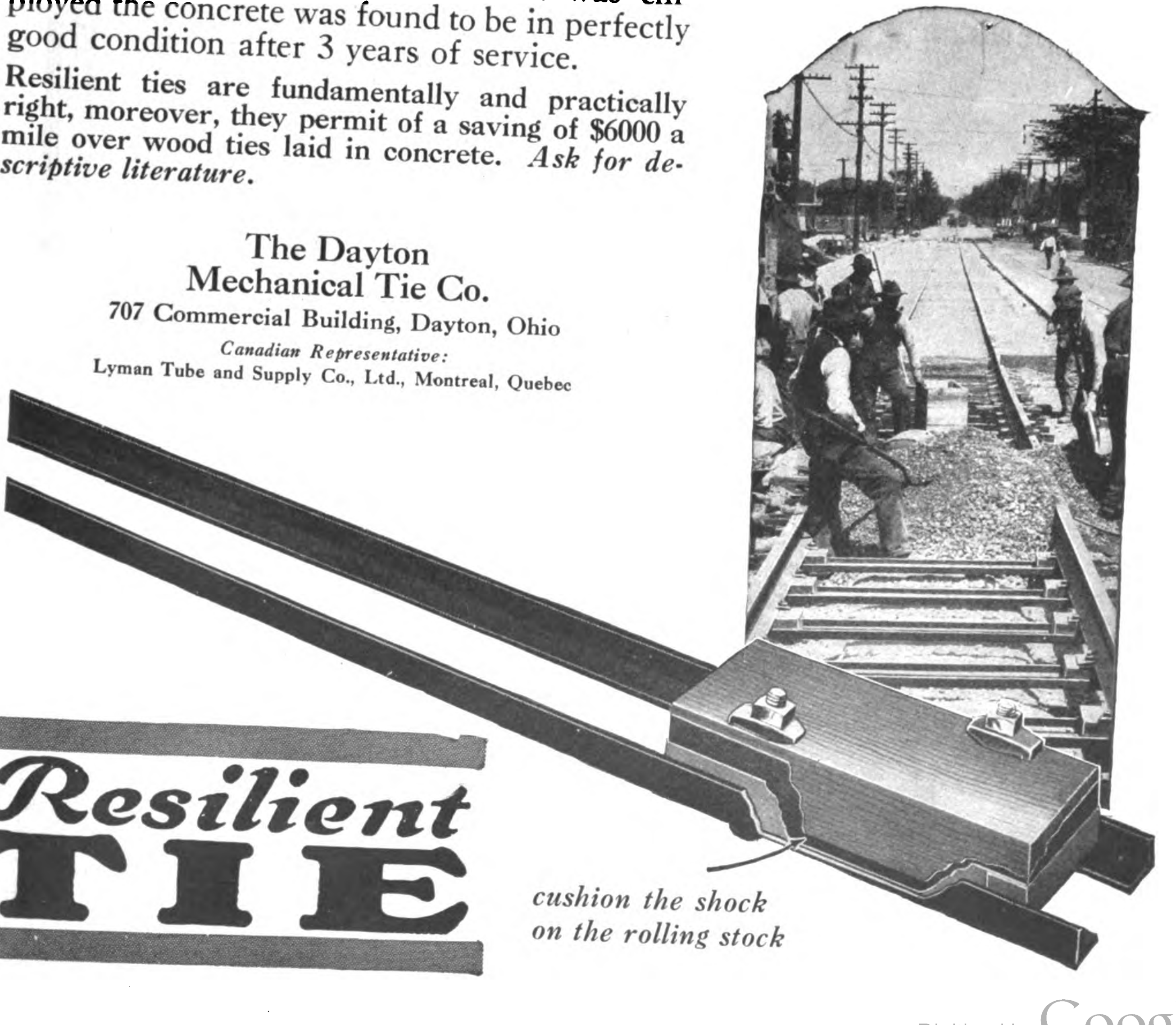
The setting of unseasoned concrete is not, in any way, disturbed by the operation of the cars over it.

The asphalt cushion in the *resilient* tie absorbs the shocks so effectively that they do not reach the green concrete.

Tests have proved this construction sound. On other properties where this method was employed the concrete was found to be in perfectly good condition after 3 years of service.

Resilient ties are fundamentally and practically right, moreover, they permit of a saving of $6000 a mile over wood ties laid in concrete. *Ask for descriptive literature.*

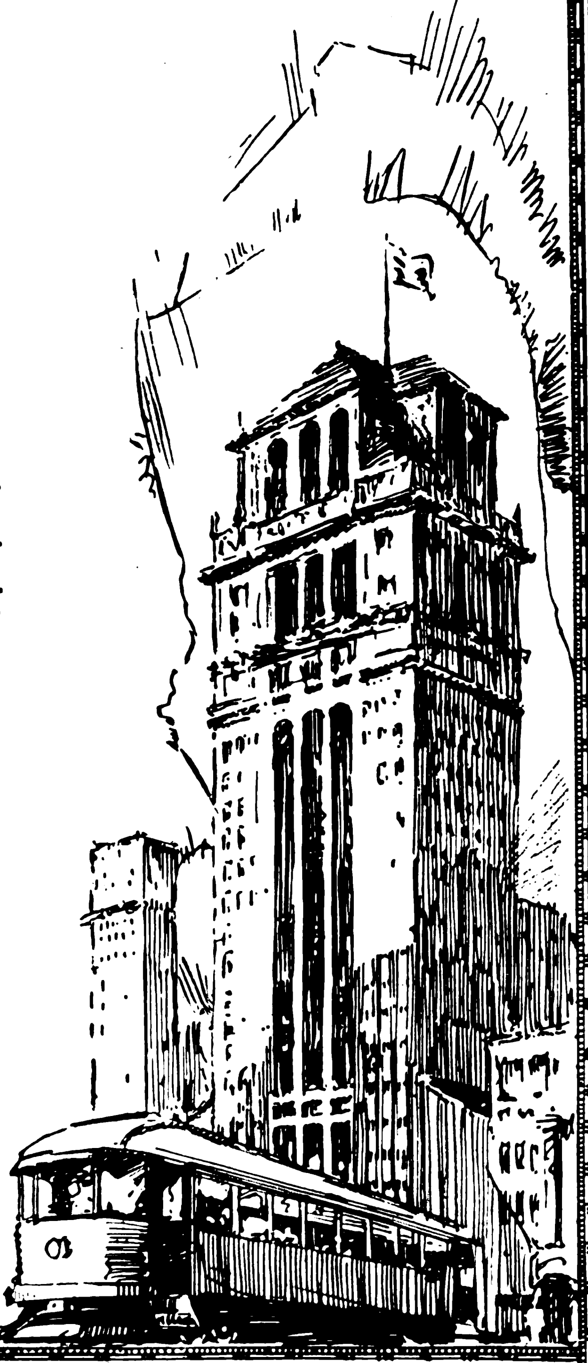
The Dayton
Mechanical Tie Co.
707 Commercial Building, Dayton, Ohio
Canadian Representative:
Lyman Tube and Supply Co., Ltd., Montreal, Quebec



Resilient
TIE

cushion the shock
on the rolling stock

COLLIER SERVICE sustains car card space value by maintaining a nation-wide organization of car advertising experts.

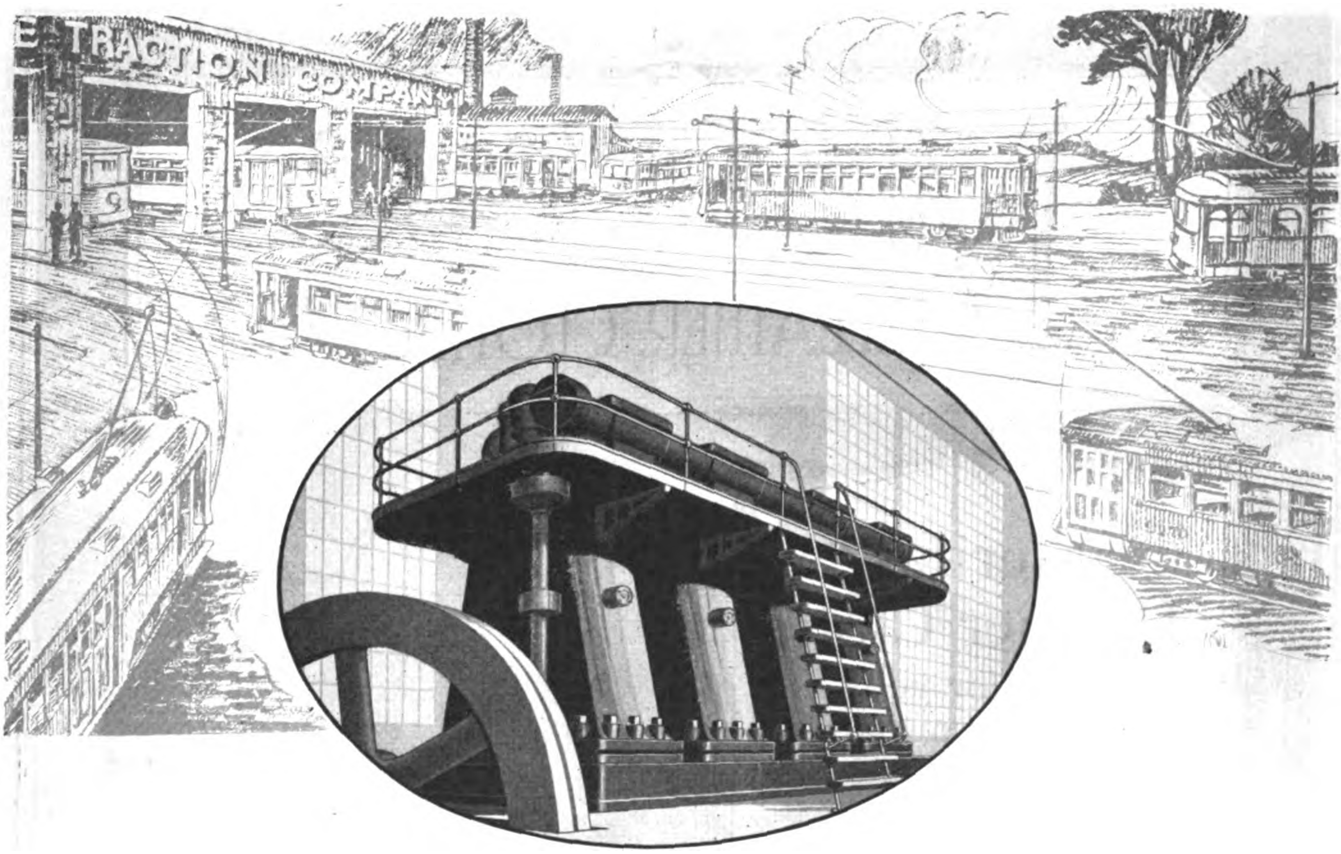


CANDLER BUILDING, THE HOME OF COLLIER SERVICE.

Barron G. Co

INCORPOR

CANDLER BLDG NEW YORK



Possibly You Can Save 25%

TREMENDOUS, unpreventable losses of energy, ever present when power is produced or transmitted, make it imperative that losses which can be prevented be brought to an absolute minimum, if you are to lower your production costs.

Lubrication, with oils and greases best fitted for the work to be done, is the one method of accomplishing this. Many times it has been proven that most of this preventable loss is due to friction, caused by the use of a poor quality lubricant or the use of a good lubricant in the wrong place.

Although a Deisel engine, similar to that shown above, is one of the most efficient types of prime movers, considerable saving is possible when the proper grades of Standard lubricants are used.

When operating under ideal conditions, approximately 33% of the energy contained in the fuel you burn is effective. The balance of 67% represents heat and friction losses, both unpreventable. But if the improper grade of lubricant is used, this efficiency may easily drop as low as 25%, causing a loss of 8%, which is about one-fourth of the maximum efficiency.

In other words, approximately 25% of your effective power can be saved if you obtain a lubricating balance with the correct grades of

Standard Oils and Greases

For lubricating Deisel engines, we manufacture several grades of lubricants to meet varying operating conditions. One of our competent staff of lubricating engineers will be glad to assist you in selecting the oil best suited to your work. Address our nearest Branch Office or write direct to

STANDARD OIL COMPANY
(INDIANA)
910 S. Michigan Boulevard
CHICAGO, ILL.

MERITAS
LEATHER CLOTH

Meritas Leather Cloth

Made for your particular purpose

There is a Meritas Leather Cloth just right in weight, grain, color and finish, for almost every purpose requiring a leather substitute. We are prepared and ready to cooperate with you in solving your particular leather cloth problem.

Meritas Leather Cloth closely resembles genuine grain leather, in appearance. Its strength exceeds that of many grades of leather, and it is less expensive, due to its durability and elimination of waste in cutting.

The surface is impervious to oils, grease, alkali, or moisture, and contains no non-drying oils to sweat to the surface, come off on clothing and leave the coating dry and brittle. It maintains its pliancy and brilliancy for years, in the face of the most severe wear. The cotton fabrics are of uniformly high grade, and are all made in our own cotton mills.

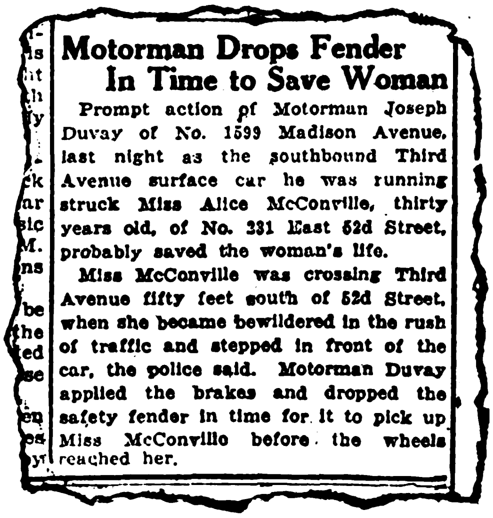
Samples for your specific requirements will be sent, on request.

THE STANDARD TEXTILE PRODUCTS CO.
320 BROADWAY, NEW YORK
Dept. E. R. J.

MERITAS
THE STANDARD TEXTILE PRODUCTS
STP
BRAND
REG U S PAT OFFICE

Saving dollars — or lives?

Does it pay to try to save a few dollars on such an important piece of equipment as a Life Guard—with results in doubt —when you know that by *experience* and *established record* the Consolidated Car Fender Company's H. B. Life Guard does save life and *results* are obtained as shown by such newspaper items as this one.



Motorman Drops Fender In Time to Save Woman

Prompt action of Motorman Joseph Duvay of No. 1599 Madison Avenue, last night as the southbound Third Avenue surface car he was running struck Miss Alice McConville, thirty years old, of No. 331 East 52d Street, probably saved the woman's life.

Miss McConville was crossing Third Avenue fifty feet south of 52d Street, when she became bewildered in the rush of traffic and stepped in front of the car, the police said. Motorman Duvay applied the brakes and dropped the safety fender in time for it to pick up Miss McConville before the wheels reached her.

What a satisfaction

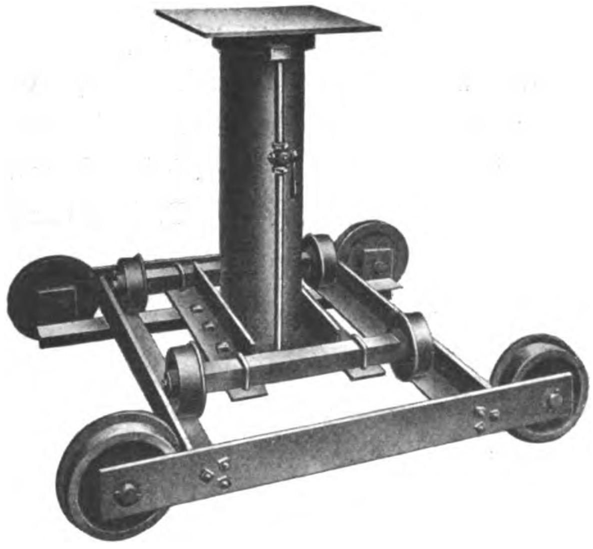
it is, to know that you have specified and insisted on having nothing but

H. B. Life Guards

to be manufactured by

THE CONSOLIDATED CAR FENDER CO.
Providence, R. I.

General Sales Agents
WENDELL & MACDUFFIE
110 East 42nd St., New York, N. Y.



The COLUMBIA Pneumatic Pit Jack

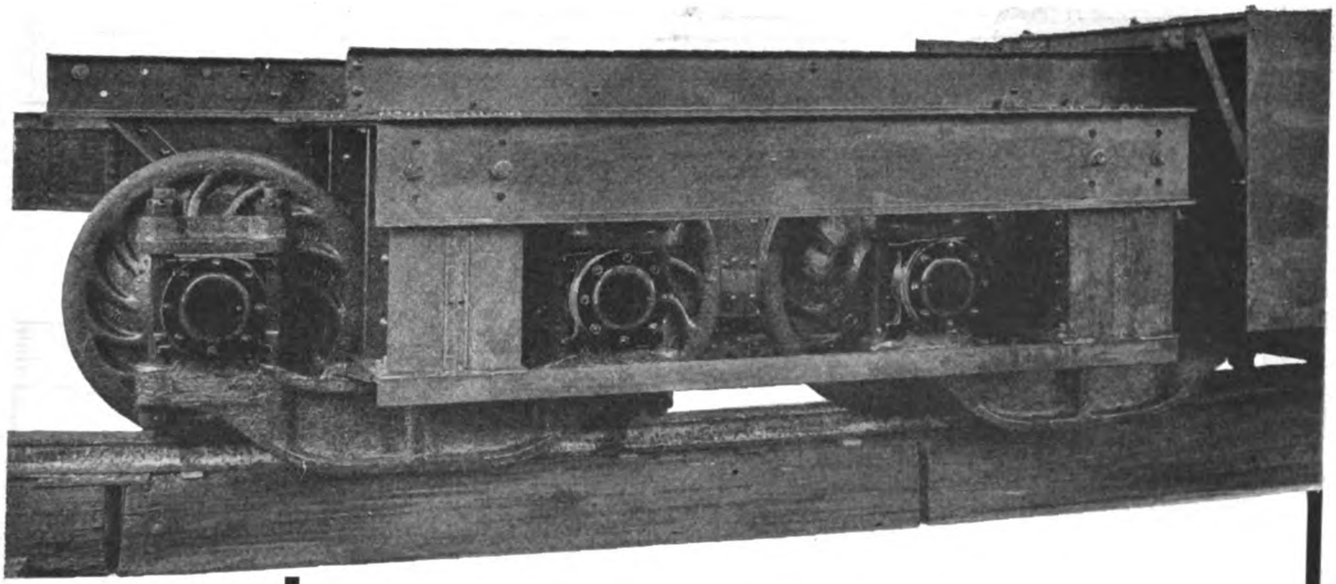
The Columbia Pneumatic Pit Jack lifts two tons with ninety pounds air pressure.

The auxiliary truck permits instant adjustment of lift to any position under the car. Height of lift is 40 inches and the stroke is 28½ inches. The platform at top of jack is 16 inches square.

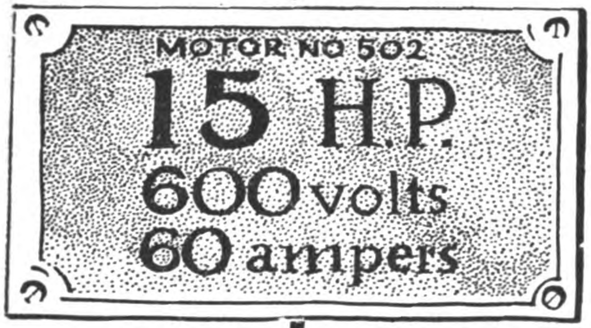
Thirty feet of standard air hose is supplied with each machine.

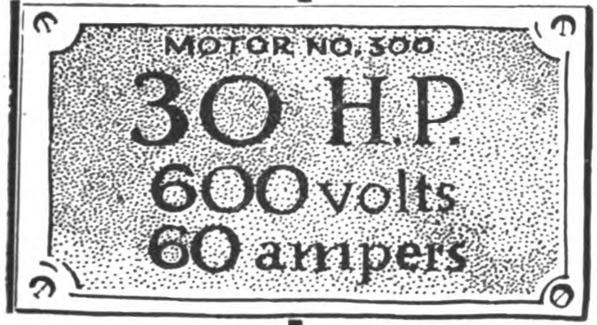
COLUMBIA 1892 MACHINE WORKS

3313 ATLANTIC AVE., BROOKLYN N. Y.



Big Cut In Motor Investment





The horsepower of electric motors has been cut in two on Turntables having journals equipped with Stafford Roller Bearings.

The illustration shows one of these Twin-Span Turntables built by the Dominion Bridge Co. of Montreal. Two 15 horsepower motors are being used on these Turntables, instead of two 30 horsepower motors which were required with Turntables having friction journal bearings.

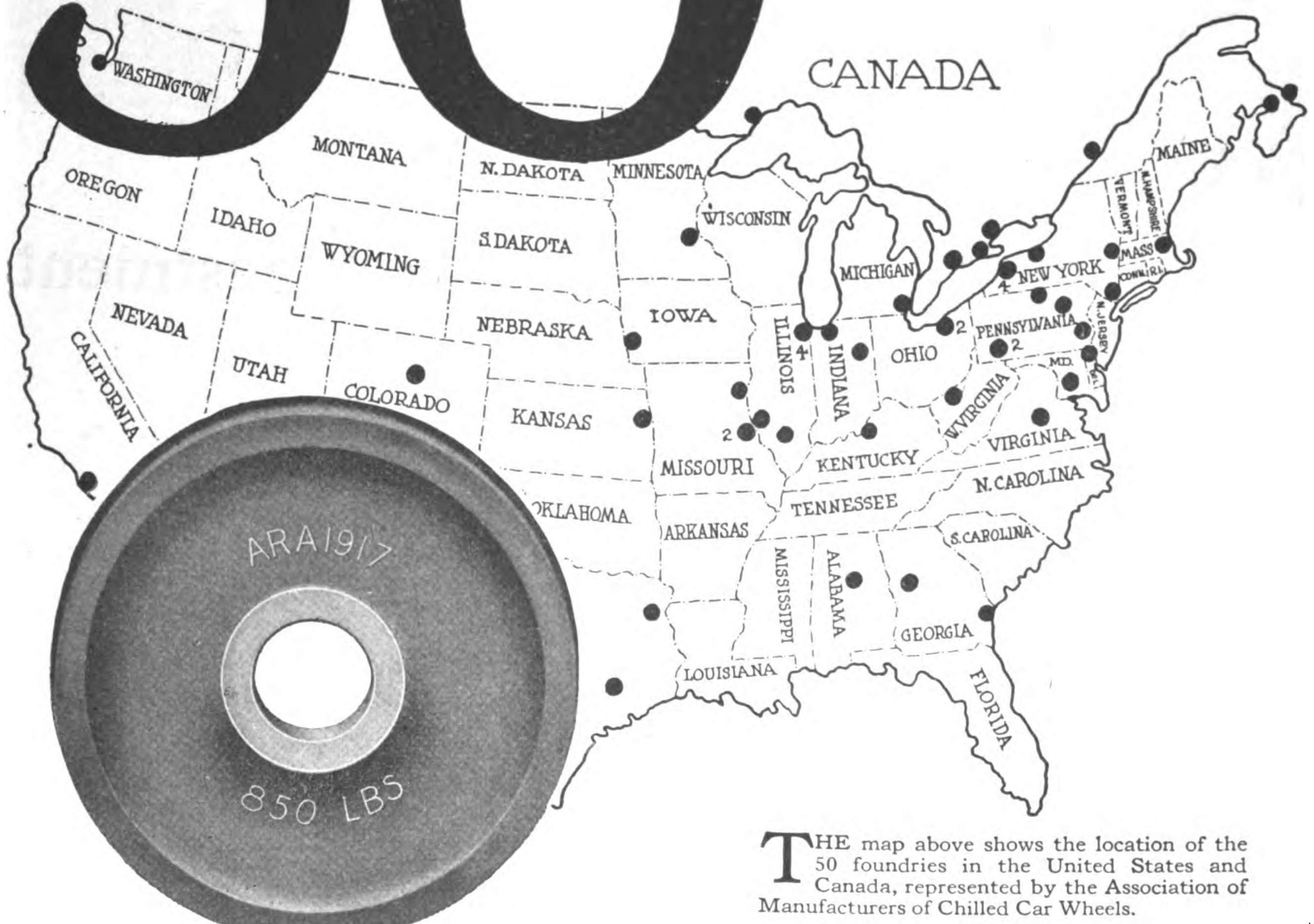
Figure out what this saving in size of motors would mean when multiplied by the number of car motors on your road.

Then figure out the enormous additional economies which will be effected in maintenance and operation, due to the 90% reduction in journal friction, and to the saving in journal-box labor, material, and supplies due to the Stafford Roller Bearings requiring attention only once a year.

Stafford—guaranteed three years.

STAFFORD ROLLER BEARING
CAR TRUCK CORPORATION
LAWTON MICHIGAN
"IT ROLLS THE FRICTION AWAY"

50 Delivery Points


CANADA
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S. DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
MINNESOTA
IOWA
MISSOURI
ARKANSAS
LOUISIANA
WISCONSIN
ILLINOIS
MICHIGAN
INDIANA
OHIO
KENTUCKY
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
S. CAROLINA
N. CAROLINA
VIRGINIA
W. VIRGINIA
PENNSYLVANIA
NEW YORK
N. JERSEY
DEL.
MD.
VERMONT
N. HAMPSHIRE
MAINE
MASS
CONN.
R.I.
4
2
2
4
2
2
ARA1917
850 LBS

THE map above shows the location of the 50 foundries in the United States and Canada, represented by the Association of Manufacturers of Chilled Car Wheels.

CHILLED IRON WHEELS for railway and street car service. Capacity 20,000 per day. 25,000,000 in service.

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS
1847 McCormick Bldg., Chicago

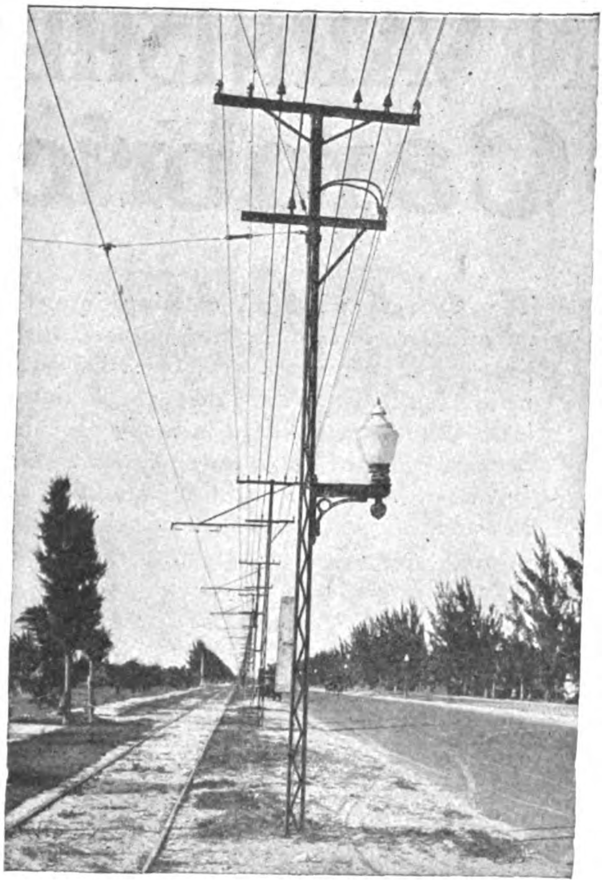
Chicago, 4
St. Louis, 2
Buffalo, 4
Pittsburgh, 2
Cleveland, 2
Amherst, N. S.
Montreal
Mich. City, Ind.
Louisville
Mt. Vernon, Ill.
Ft. Wayne, Ind.
Birmingham
Atlanta
Savannah
Boston
Detroit
St. Paul
Kansas City, Kan.
Denver
Tacoma
Rochester, N. Y.
Sayre, Pa.
Berwick, Pa.
Albany
Toronto
New Glasgow, N. S.
Madison, Ill.
Huntington, W. Va.
Wilmington, Del.
Houston, Tex.
Hannibal, Mo.
Reading, Pa.
Baltimore
Richmond, Va.
Ft. William, Ont.
St. Thomas
Hamilton
Ramapo, N. Y.
Marshall, Tex.
Los Angeles
Council Bluffs

American Railroad Association Standards

650 lb. wheel for 60,000 Capacity Cars
700 lb. wheel for 80,000 Capacity Cars
750 lb. wheel for 100,000 Capacity Cars
850 lb. wheel for 140,000 Capacity Cars

The Standard Wheel for Seventy-Two Years

CHILLED IRON WHEELS



Use

Bates Steel Poles

With your other first-class equipment and the whole installation will be permanent and an inducement for your security buyers.

Bates Steel Poles are being used in rapidly increasing numbers in all types of modern construction all over the world. With their distinct advantages of strength, permanence, economy, and their wide range of adaptability, Bates Poles have met the exacting demands of pole users who are recognized as leaders in the electrical industry.

Bates Expanded Steel Truss Co.

Illinois Merchants Bank Bldg., Chicago, Ill.

There's a Bates Pole for every Pole purpose.

BATES ONE PIECE EXPANDED STEEL POLES

ANDERSON LINE MATERIAL

with

Aetna Insulation

For over twenty years, Anderson Line Material has been a leader in the field because of its eminently satisfactory and long service. Aetna Insulation has helped to make this reputation for it.

Aetna Insulation is our own special compound. Developed years ago, it has continued ever since to meet the exacting requirements of electric railroad line service.

—Let us send our catalog—

Round Top Straight Line Suspension

Adjustable Insulated Crossover

TRADE MARK

Reg. U. S. Pat. Off.

Albert & J. M. Anderson Mfg. Co.

Established 1877

289-293 A St., Boston, Mass.

Branches—New York, 135 Broadway. Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St. London. E C. 4, 38-39 Upper Thames St.

TRADE MARK AETNA REGISTERED

IRVINGTON VARNISHED Cambric

The Copper and Steel entering into the manufacture of motors, transformers, turbo generators, etc., never wear out. Oil is renewed, but the only factor that can deteriorate is the insulation, and that in many cases has been good for the life of the equipment where Irvington Varnished Cambric was used. It has stood and will stand the test of time. That is why the large manufacturers insist on Irvington. Ask for samples and prices.

Seven factors of Quality

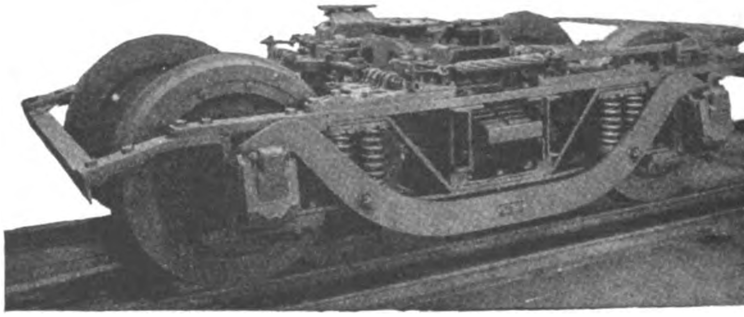
High Dielectric Strength Non-Hygroscopic
High Resistance Heat Resisting
Flexibility Chemically Neutr
Maximum Elasticity

IRVINGTON VARNISH & INSULATOR Co
Irvington, New Jersey.
Established 1905

Sales Representatives:

Mitchell-Rand Mfg. Co., New York
T. C. White Electric Supply Co., St. Louis
E. M. Wolcott, Rochester
L. L. Fleig & Co. Chicago
Consumers Rubber Co., Cleveland
Clapp & Lamoree, Los Angeles
F. G. Scofield, Toronto

Chatter-Proof Brakes on all Baldwin Improved Motor Trucks For Electric Railways



Baldwin Class "AA" Motor Truck, built for the Osaka Railway, Japan

AMONG the many notable features of Baldwin Electric Motor and Trailer trucks for high speed electric interurban and street railway service, are the brakes and the method of brake suspension. Internationally known as the simplest and best design of brake.

Baldwin Brakes are always to be depended upon

Baldwin representatives in all principal countries of the world.
Detailed information upon request.

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA, U. S. A. Cable Address, "Baldwin, Philadelphia"

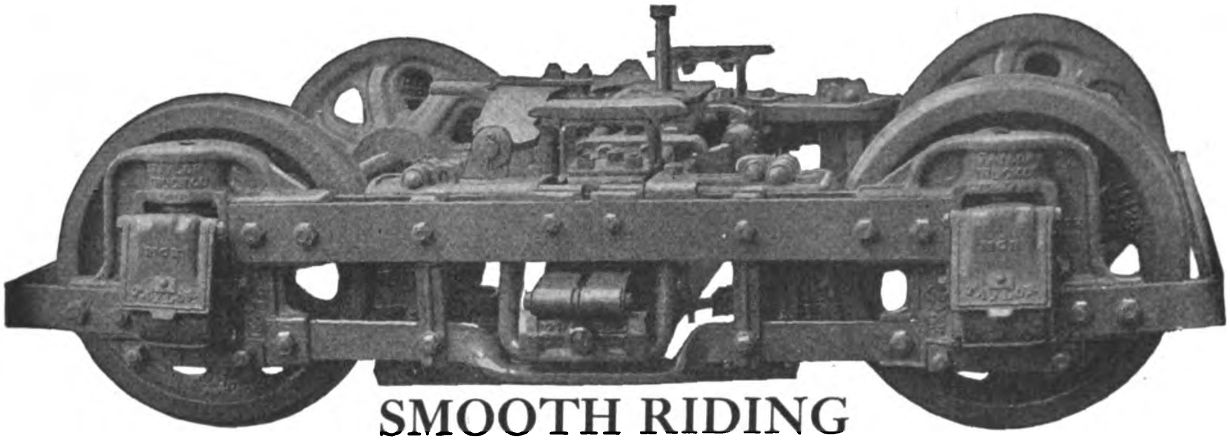
R. H.

TAYLOR REDUCED HEIGHT TRUCK

WITH

S. A.

TAYLOR STRAIGHT ACTION BRAKE



SMOOTH RIDING

LOW MAINTENANCE COST—Absolute Safety

Center Plate Height 22¾ in. with 26 in. Diam. Wheels

For Modern Low Level Double Truck Cars, the Taylor R. H. Truck, equipped with Taylor S. A. Brake, with large diameter hard steel pins, will provide the best possible service results from every standpoint.

TAYLOR ELECTRIC TRUCK CO., TROY, N. Y.

SPECIFICATIONS ON REQUEST Established 1892 SEND FOR PORTFOLIO

10 seconds to change wheels!

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Detachable Trolley Harps

Trolley wheel mileage can be increased and service interruptions reduced when Bayonet Trolley Harps are used. They permit removal of wheel and harp for inspection, lubrication, adjustment or repair. The change is made in a fraction of a minute—no tools needed.

With Bayonet Detachable Harps, there is no need or incentive for running a wheel which needs some minor repair. That's the kind of business which shortens the life of equipment. Bayonet Equipment helps you to prolong its life.

BAYONET TROLLEY HARP CO.

Wheels
Sleet Cutters
Bases with Detachable Pole Clamps

Bayonet Trolley Harp Co., Springfield, Ohio

Nahango

A kiffir kid, when he loses his first teeth, must throw them on top of the hut with a plea to the invisible grandmother to exchange them for her harder and more durable teeth.

The first were unsatisfactory—hence the nahango (changing teeth).

And on this side of the planet you see an operator throw some ill-chosen carbon brushes back on the maker saying, "These brushes wore out too fast, send us some that are more durable."

And the old grandmother sends some harder ones. Later he has to write to the motor people saying "These commutators wore out too fast, send us some that are more durable."

Funny, isn't it, how people will fool around with slapstick methods forgetting that Morganite brush engineers figure out brush applications with slip-stick accuracy.

Morganite Brush Co., Inc.

Main Office and Factory:

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DISTRICT ENGINEERS AND AGENTS:

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J. F. Drummey, 75 Pleasant St., Revere, Massachusetts

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Special Service Sales Company, 502 Delta Bldg., Los Angeles

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Our Cars Cost Less To Maintain

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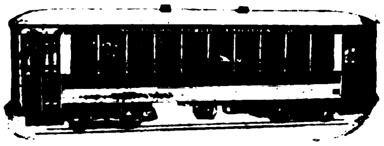

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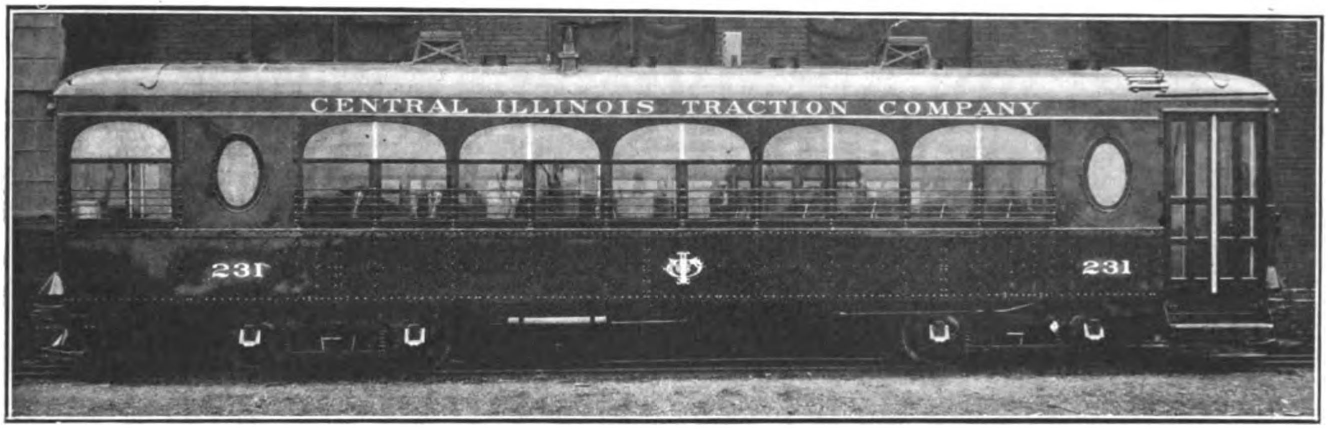

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These double-end, double-truck cars of the "Safety" type, 43 feet long over all, arranged with a smoking compartment have a seating capacity of 44 passengers. They are mounted on St. Louis trucks CM-69, equipped with four 35 H.P. motors.

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"The Birthplace of the Safety Car"

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CORRECT IT
USE LE CARBONE CARBON BRUSHES

They talk for themselves

COST MORE PER BRUSH
COST LESS PER CAR MILE

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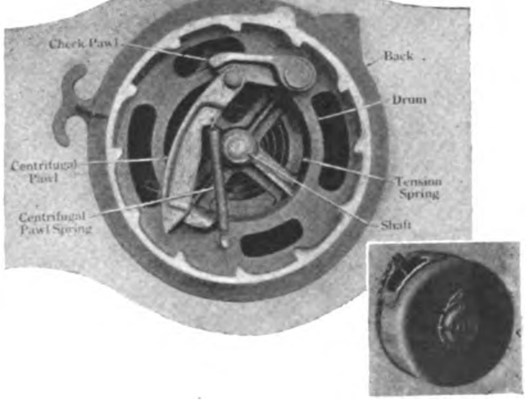

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cannot be overwound. The one-piece tension spring maintains steady even tension throughout long years of service. It requires a minimum of winding effort, saving time, avoiding delays.

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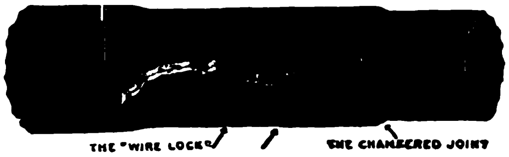

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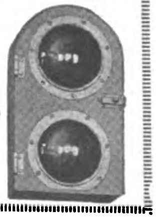

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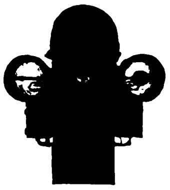

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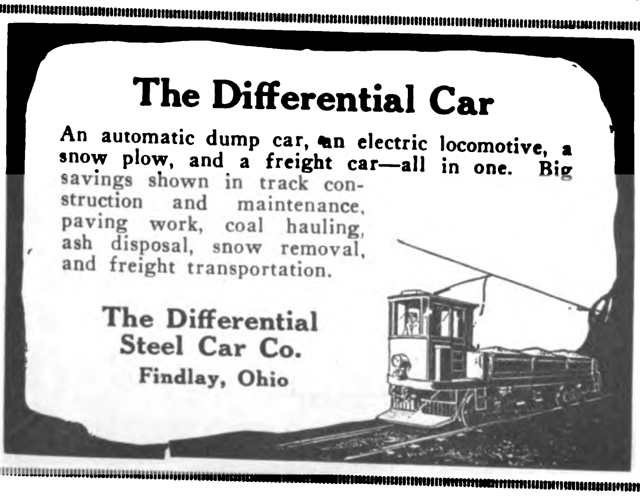

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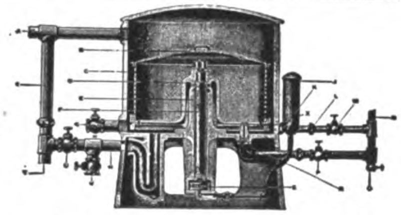

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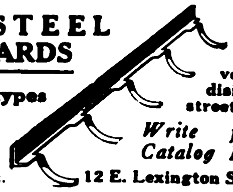

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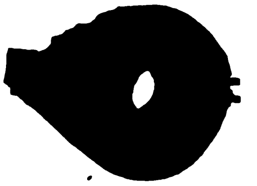

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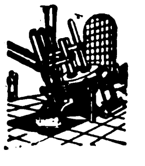

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Use only Awebco Tape on your Armatures
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Type R-10

Type R-10 International Single Register. This register, hand or foot operated, is also arranged for electric operation, and the double Type R-11 is arranged for hand operation or electric operation.

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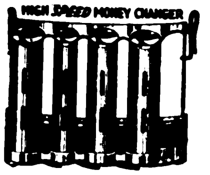
1923 model —without rivets— ready for delivery



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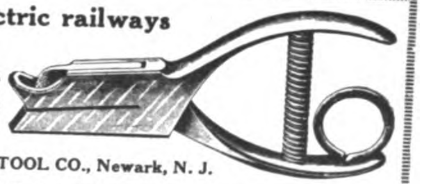

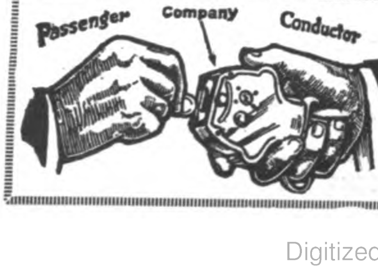

Direct Automatic Registration By the Passengers
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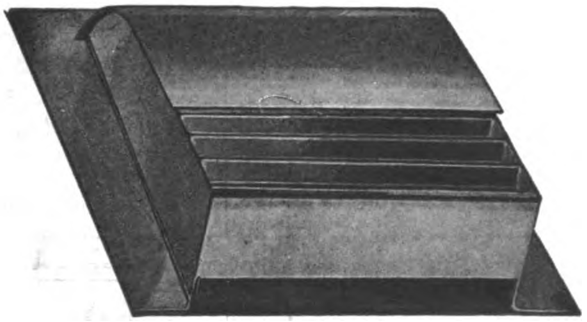

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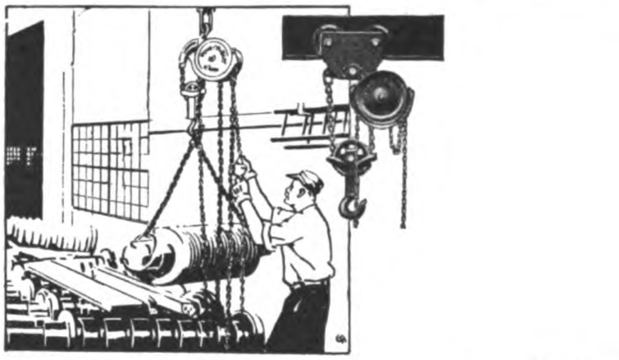

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0099

POSITIONS VACANT

LINE FOREMAN WANTED, on property of fifty miles, in reply state age, experience and salary expected. P-574, Elec. Railway Journal, Real Estate Trust Bldg., Philadelphia, Pa.

ROADMASTER wanted with considerable experience for large property in Central Ohio. P-571, Elec. Railway Journal, Leader-News Bldg., Cleveland, Ohio.

TWO master mechanics wanted, 1 for city with 45 city cars, 1 for interurban with 40 interurban cars. Both shops located in the Middle West. Have good shops, tools and machinery. P-567, Elec. Railway Journal, Leader-News Bldg., Cleveland, Ohio.

POSITIONS WANTED

BARN SUPERINTENDENT, or assistant to Master Mechanic. 15 years' shop and car house experience, also familiar with operating rules and schedules. Good reason for making change. Best of references. Married, age 38, good health. PW-575, Elec. Railway Journal, Real Estate Trust Bldg., Philadelphia, Pa.

MANAGER or superintendent railway, light and power properties, technical successful organizer and tactful in public relations and very resourceful in rehabilitating properties. Member A.I.E.E. Available in 30 days. PW-557, Elec. Railway Journal, 10th Ave. at 36th St., New York.

MASTER mechanic or superintendent of rolling equipment, open for a position in two weeks. Have had charge of all repairs 500 cars. Can get results. 20 years' experience. Age 38. PW-570. Elec. Railway Journal, 10th Ave. at 36th St., New York.

1000 Tons

85 lb. A. S. C. E. Section

Relaying Rails

with Angle Bars

Immediate Shipment

Central South and Southwestern delivery

S. W. LINDHEIMER

1st National Bank Bldg.
Chicago, Ill.

Rails and Track Material

FOR SALE

25-Ton All Steel

BALDWIN ELECTRIC LOCOMOTIVE

Fully Equipped

Excellent Condition

Immediate Delivery

FS-566, Electric Railway Journal
10th Ave. at 36th St., New York City

POSITIONS WANTED

SUPERINTENDENT of railway department, competent to take full charge. 20 years' experience in the electric railway field and hydro electric operation. PW-555, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of transportation, with a proven successful record of nineteen years on city, suburban and interurban properties, solicits correspondence with managers who are in need of a capable, efficient superintendent; successful in dealing with public and labor; recognized as an operating official who gets results; at present with large property; personal reasons for desiring a change. High grade references furnished as to ability to take over any property and get results. PW-568, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

The Department of Street Railways

CITY OF DETROIT

is offering for sale

6—2 Arc Wilson Plastic-arc Gasoline Driven Welders, equipped with two KA-Welding Panels, each on skids, manufactured by the Wilson Welders & Metals Company of New York City.

This equipment is in first class condition, having been thoroughly overhauled by our own department and may be inspected at the machinery warehouse, Department of Street Railways, St. Jean and Shoemaker Avenues.

Proposals are solicited for all or any part of the above offering and these may be directed to Geo. J. Finn, Commissioner, Department of Purchases and Supplies, 710 Marquette Building, Detroit, Michigan.

These proposals will have our consideration on Wednesday, July 25th, 1923, at 10:30 A. M., at which time we will answer all communications covering proposals on this equipment.

POSITIONS WANTED

SUPERINTENDENT of rolling equipment with a successful record of 20 years on large properties desires a change and solicits correspondence with managers that are in need of a capable progressive man who knows how to get results in economical operation. Age 38. PW-569, Elec. Railway Journal, 10th Ave. at 36th St., New York.

SALESMEN WANTED

Live Experienced Salesman

With initiative to sell electric and steam railroad supplies. Location Washington, covering vicinity and South. Prefer man with technical training or equivalent. Responsible position with future given right man. Furnish details fully. Confidential. SW-576, Electric Railway Journal, 10th Ave. at 36th St., New York.

FOR SALE

Two—4 cylinder Reo Motor 15 Passenger Busses

Mounted on Standard Steel RR Wheels and Axels

Also a 13-foot Long Box Car Trailer

All in Good Condition

A very handy, convenient and economical outfit for a small railroad

Also the original tires and axels to readjust for general road work

WRITE FOR PHOTO AND PARTICULARS

Bargain for Quick Transaction

Hyman-Michaels Company
531 Peoples Gas Bldg., Chicago

FOR SALE

D. C. ENGINE DRIVEN SETS

ATTRACTIVE PRICE FOR QUICK SALE

1—Buckeye Engine, 18¾ x 18¾, direct connected to General Electric Co.'s generator, Type MP, Class 8-165-240, Form A-2, volts 250/275, generator No. 25826.

1—Buckeye Engine, 18¾ x 18, direct connected to General Electric Co.'s generator, Type MP, Class 8-165-240, Form L, volts 250/275, generator No. 31345.

1—Buckeye Engine, 18¾ x 18¾, direct connected to General Electric Co.'s generator, Type MP, Class 6-165-240, Form R, volts 250/275, generator No. 159425.

1—22 x 36 x 42 cross-compound vertical Corliss Engine, made by Filer-Stowell Co., Milwaukee, Wis., direct connected to General Electric Co.'s 525 kw., 525/575 volt, 100 r.p.m., generator No. 31209.

2—Allis-Chalmers 26 x 36 Corliss horizontal Engines, direct connected to Allis-Chalmers 500 kw., 550/575 volt, 125 r.p.m., generators Nos. 38316 and 38382.

The switchboard equipment for these generators will consist of generator panels only, which includes circuit breaker, ammeter and switches.

Filer-Stowell Engine and Generator available about July 1st, 1923. Allis-Chalmers Units available about August 10th, 1923. All of the above equipment is now in operation in the Pittsburgh district. Address T. S. Duncan, P. O. Box 940, Pittsburgh, Pa.

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Receivers, Aftercoolers
Ingersoll-Rand Co.

Anchors, Guy
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Armature Shop Tools
Elec. Service Supplies Co.

Automatic Return Switch Stand
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

Axles
Bemis Car Truck Co.
St. Louis Car Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

Babbitt Metal
Ajax Metal Co.
More-Jones B. & M. Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Electric Service Supplies Co.
International Register Co., The

Batteries, Dry
Nichols-Lintern Co.

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
A. Gilbert & Sons, B. F. Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

Bearings, Center and Roller Side
Baldwin Locomotive Works
Stucki Co., A.

Bearings, Roller
Stafford Roller Bearing Car Truck Co.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Heating Co.
Elec. Service Supplies Co.

Benders, Rail
Ry. Track-work Co.

Boilers
Babcock & Wilcox Co., The

Boiler Tubes
National Tube Co.

Bond Testers
Amer. Steel & Wire Co.
Elec. Service Supplies Co.

Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Imp. Co.
Elec. Service Supplies Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Railway Track-work

Bonds, Rail
Amer. Steel & Wire Co.
Elec. Railway Imp. Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse Elec. & M. Co.

Brackets and Cross Arms (See also Poles, Ties, Posts etc.)
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Bates Exp. Steel Truss Co.
Creaghead Eng. Co.
Elec. Ry. Equip. Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
Nat'l Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Taylor Electric Truck Co.
Wheel Truing Brake Shoe Co.

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Ackley Brake & Sup. Corp.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Taylor Electric Truck Co.
Westinghouse Tr. Br. Co.

Bridges & Buildings
American Bridge Co.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Morganite Brush Co., Inc.
Westinghouse Elec. & M. Co.

Brushes, Graphite
Morganite Brush Co., Inc.

Brush Holders
Anderson M'fg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Brushes, Wire Pneumatic
Ingersoll-Rand Co.

Bunkers, Coal
American Bridge Co.

Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.

Bushings
Nat'l Vulcanized Fibre Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.

Cables (See Wires and Cables)

Cambric Tapes, Yellow & Black Varnish
Irvington Varnish & Ins. Co.

Carbon Brushes (See Brushes, Carbon)

Car Lighting Apparatus
Elec. Service Supplies

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Westinghouse Elec. & M. Co.

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Differential Steel Car Co., Inc.

Cars, Gas Rail
St. Louis Car Co.

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Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Thomas Car Works Perley A.
Wason Mfg. Co.

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Electric Equipment Co.

Cars, Self-Propelled
General Electric Co.

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Baldwin Locomotive Works
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

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Wharton, Jr. & Co., Inc., Wm.

Castings, Gray Iron and Steel
American Bridge Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Wharton, Jr., & Co., Inc., Wm.

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Bemis Car Truck Co.
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Earll, C. I.
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Ohio Brass Co.
Wood Co., Chas. N.

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Archbold-Brady Co.

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Cleveland Fare Box Co.
Galef, J. L.

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Westinghouse Elec. & M. Co.

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Dossert & Co.
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Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
WestinghouseElec . & M. Co.

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Brill Co., The J. G.
Ohio Brass Co.

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General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

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General Electric Co.
Rome Wire Co.

Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Westinghouse Elec. & M. Co.

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Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

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Cleveland Fare Box Co.
Galef, J. L.
International Register Co. The

Coin Sorting Machines
Cleveland Fare Box Co.
Galef, J. L.

Coin Wrappers
Cleveland Fare Box Co.
Galef, J. L.

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Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Commutator Truing Devices
General Electric Co.

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Cameron Elec'l Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
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Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.

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Ingersoll-Rand Co.

Compressors, Gas
Ingersoll-Rand Co.

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Ingersoll Rand Co.
Westinghouse Elec. & M. Co.

Condensor Papers
Irvington Varnish & Ins. Co.

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Std. Underground Cable Co.

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Elec. Service Supplies Co.
Ohio Brass Co.

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General Electric Co.
Westinghouse Elec. & M. Co.

Controller Regulators
Electric Service Supplies Co.

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Westinghouse Elec. & M. Co.

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General Electric Co.
Westinghouse Elec. & M. Co.

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Anaconda Copper Mining Co.

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Nat'l Vulcanized Fibre Co.

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Electric Service Supplies Co.
International Register Co., The
Roeblings Sons Co., John A.
Samson Cordage Works
Silver Lake Company

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Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Cross Arms (See Brackets)

Crossings
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Crossing Foundations
International Steel Tie Co.

Crossing Frogs and Switches
Ramapo Ajax Corp.
Wharton, Jr., & Co.,Inc.,Wm.

Crossings, Manganese
Indianapolis Switch & Frog Co.
Ramapo Ajax Corp.

Crossing Signals (See Track, nals, Crossing)

Crossings, Track, (See Track, Special Work)

Crossings, Trolley
Ohio Brass Co.

Curtains and Curtain Fixtures
Brill Co., The J. G.
Edward Co., Inc., The O M
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Morton Mfg. Co.

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Electric Equipment Co.
Transit Equipment Co.

Derailing Switches, Tee Rail
Ramapo Ajax Corp.

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Creaghead Eng. Co.
Electric Service Supplies Co.

Detective Service
Wish Service, P. Edward

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National Pneumatic Co., Inc.

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General Electric Co.
Hale & Kilburn Corp.
Safety Car Devices Co.

Doors, Folding Vestibule
National Pneumatic Co., Inc.

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Drills, Rock
Ingersoll-Rand Co.

Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.

Dryers, Sand
Electric Service Supplies Co.

Ears
Ohio Brass Co.

Electric Grinders
Railway Track-work Co.

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Indianapolis Switch & Frog Co.
Railway Track-work Co.

Electrodes, Steel
Indianapolis Switch & Frog Co.
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Day & Zimmerman, Inc.
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Shaw, Henry M.
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Ohmer Fare Register Co.

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Frogs, Trolley
Ohio Brass Co.

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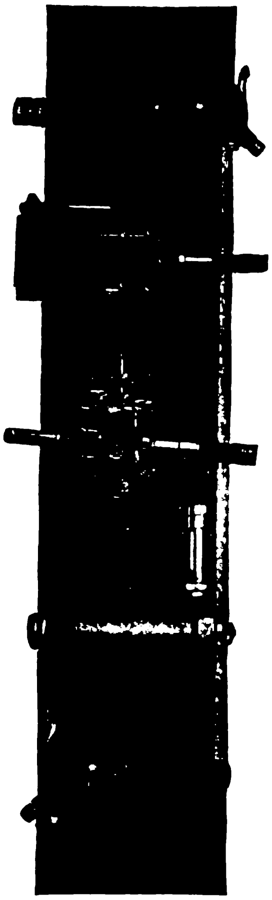

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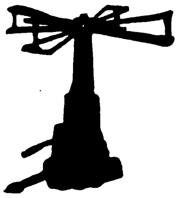

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Fort Pitt Spring & Mfg. Co., Springs
C-H Electric Heaters
Garland Ventilators
E-Z Car Control Corp. Safety Devices
Lind Aluminum Field Coils
Flaxlinum Insulation
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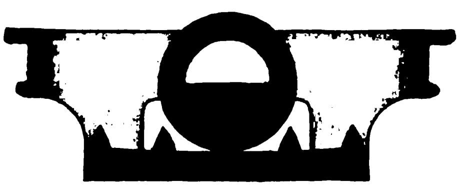
Anderson Slack Adjusters



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Amer. Ins. Machinery Co.

Insulating Silk
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Electric Service Sup. Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Westinghouse Elec. & M. Co.

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Electric Ry. Equipment Co.
Electric Service Sup. Co.
Electrose Mfg. Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Western Electric Co.
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Hubbard & Co.

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Insulation, Slot
Irvington Varnish & Ins. Co.

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Irvington Varnish & Ins. Co.

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Marsh & McLennan

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Buda Company
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National Ry. Appliance Co.

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Brill Co., The J. G.

Junction Boxes
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Westinghouse E. & M. Co.

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Anderson M. Co., A. & J. M.
General Electric Co.
Westinghouse E. & M. Co.

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Nichols-Lintern Co.

Lanterns, Classification
Nichols-Lintern Co.

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Standard Textile Products Co.

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Shaw, Henry M.

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Anderson M. Co., A. & J. M.
Electric Service Sup. Co.
General Electric Co.
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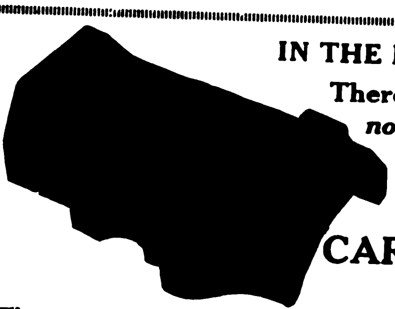

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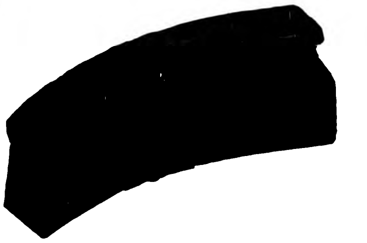

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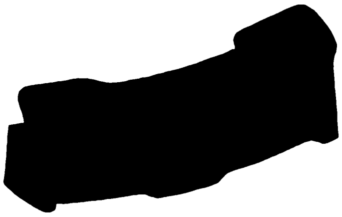

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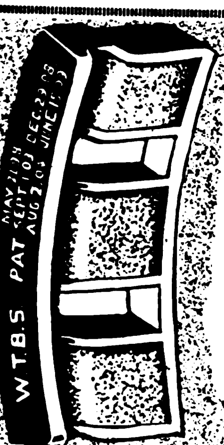

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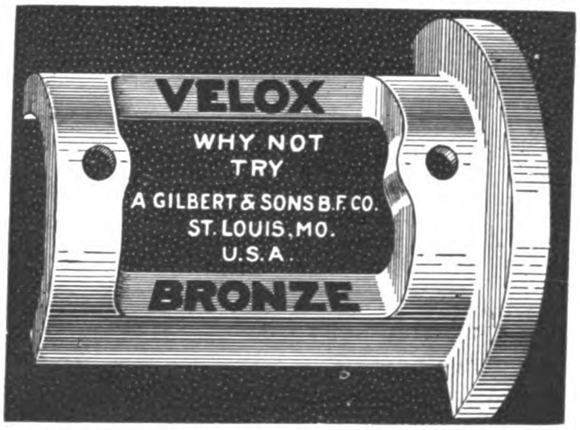
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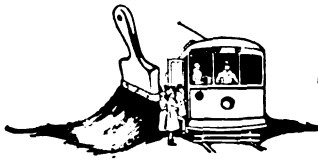
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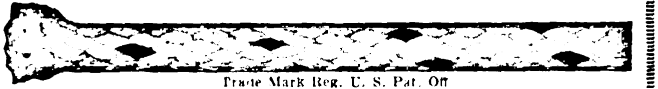
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Bemis Car Truck Co., Springfield, Mass.

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THERMOSTATS BUZZERS
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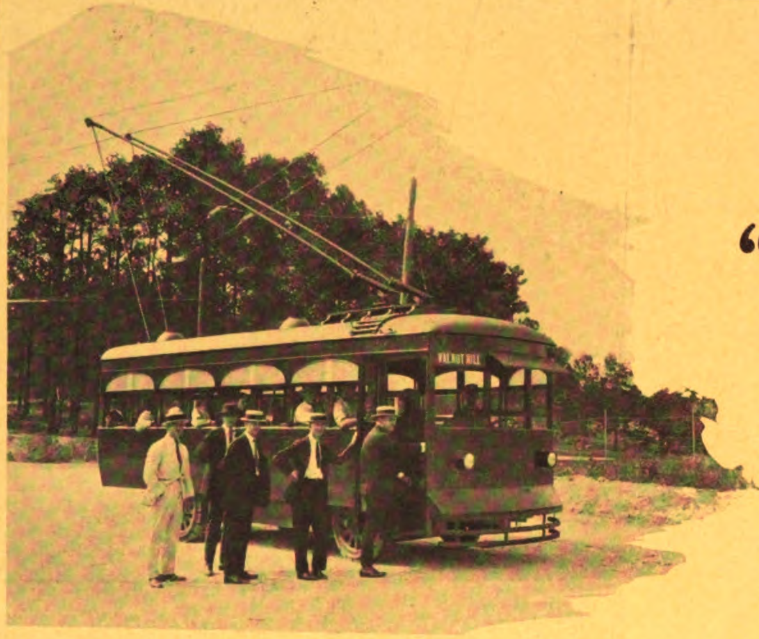


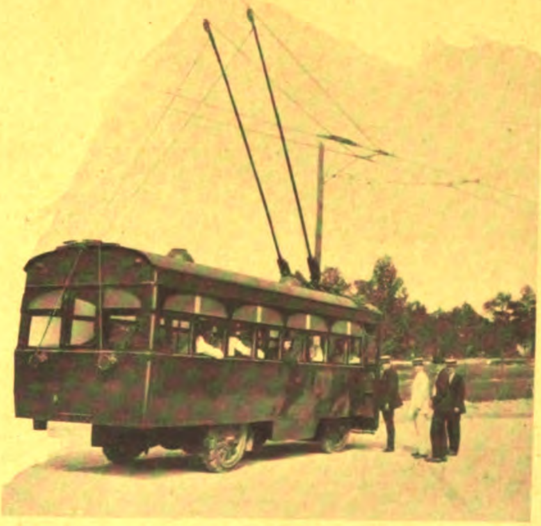
BRILL "RAIL-LESS" CAR

Service Extension

Petersburg, Va.

Seven-tenths of a mile beyond the end of the Walnut Hill car line in Petersburg is a Municipal Park and the Country Club. The transportation problem in this district has just been solved by the Virginia Railway & Power Company placing two Brill "Rail-less" Cars in service.

This service extension and public accommodation is made possible by the economical cost of installation and operation of this type vehicle. Transfers are issued on the company's Safety Cars, which permit patrons to continue their journey to the Park or Country Club on the "Rail-less" Cars.



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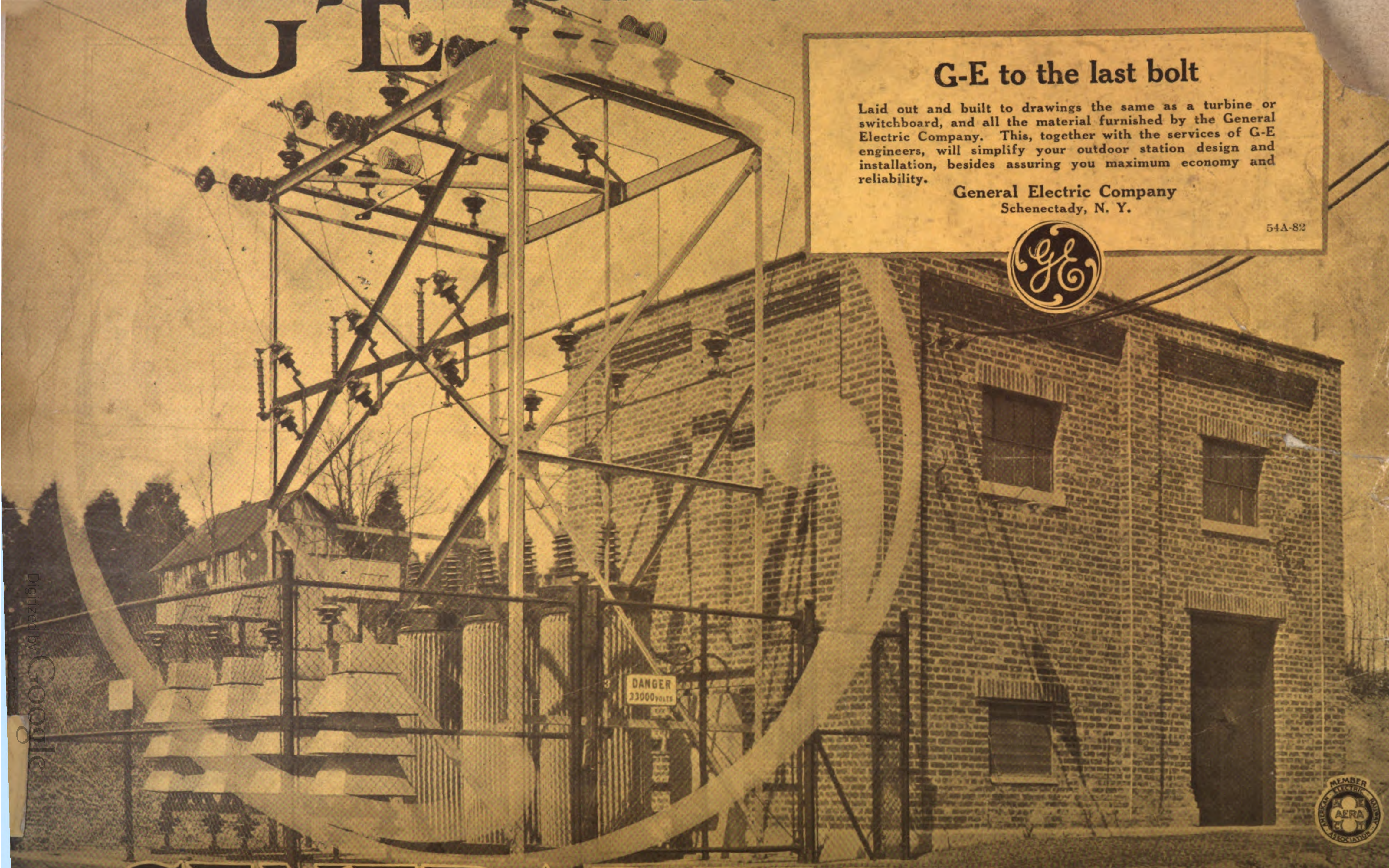

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G-E to the last bolt

Laid out and built to drawings the same as a turbine or switchboard, and all the material furnished by the General Electric Company. This, together with the services of G-E engineers, will simplify your outdoor station design and installation, besides assuring you maximum economy and reliability.

General Electric Company
Schenectady, N. Y.

54A-82

GENERAL ELECTRIC

McGraw-Hill Co., Inc. July 14, 1923 Twenty Cents Per Copy

ELECTRIC RAILWAY JOURNAL

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The quality of Stackpole carbon brushes will hand back in long life and uninterrupted commutation a very liberal profit above their slightly higher cost.

The most important development in the history of the carbon business:

Stackpole **L-30** grade for railway motors (both ventilated and enclosed types). **S-932** and **S-933** grades for rotary converter slip-rings of all sizes and speeds, and for slip-ring induction motors where maximum current carrying capacity is desired.

Stackpole Products: Carbon, graphite and metal brushes for all types of motors, generators, magnetos and slip-rings. Welding, flashlight and dry-cell carbons. Carbon flour and carbon specialties.

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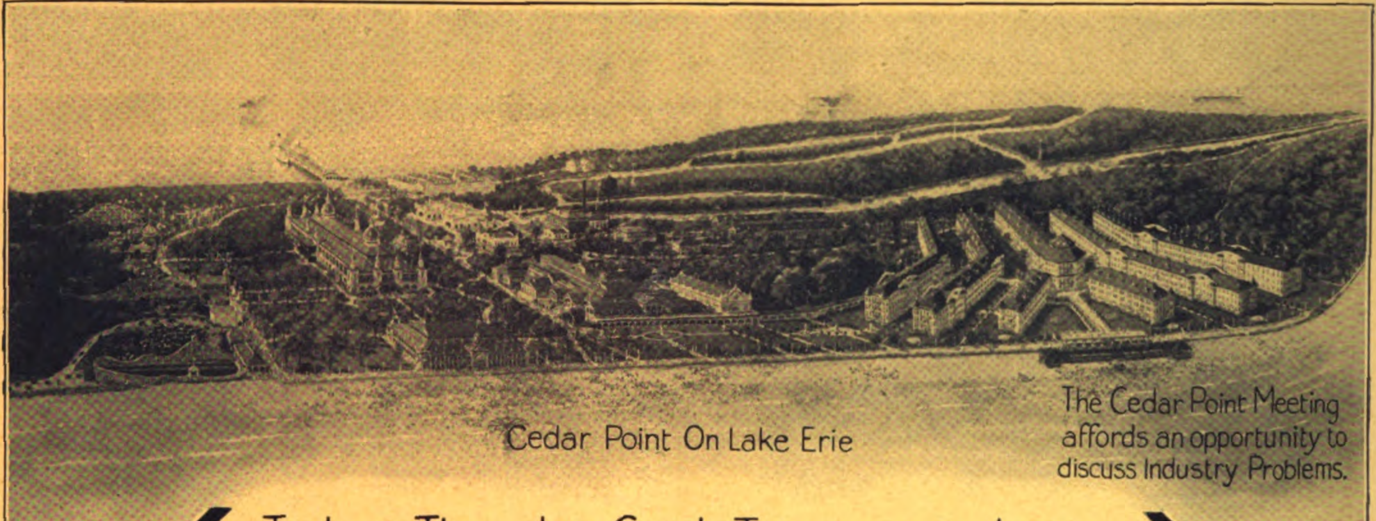

Cedar Point On Lake Erie

The Cedar Point Meeting affords an opportunity to discuss Industry Problems.

Today's Thoughts Guide Tomorrow's Actions

The continued improvement in the Electric Railway Industry promises a bright future. To make the rosy hue a golden reality, serious thought must be given toward removing the numerous things that curtail net revenues.

Among these things we must develop a better attitude of mind on the part of the public, toward relieving burdens and imposts that absorb much of the gross revenues. Removing such handicaps will enhance the credit of the industry and enable it to give better service and enjoy the revenue from increased freight haulage; the economy of installing light-weight, double-truck, one-man cars, and light-weight, double-truck cars arranged for train operation.

Economies may also be effected by the reduction in cost of maintenance by the retirement of obsolete motors in favor of improved or more efficient, ventilated motors. The use of labor-saving devices and more efficient shop equipment will also bear fruit.

Westinghouse Engineers are always making a study of all phases of electric transportation problems and are ready to assist you to solve your problems.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA

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Westinghouse

Vol. 62, *No.* 2

New York, July 14, 1923

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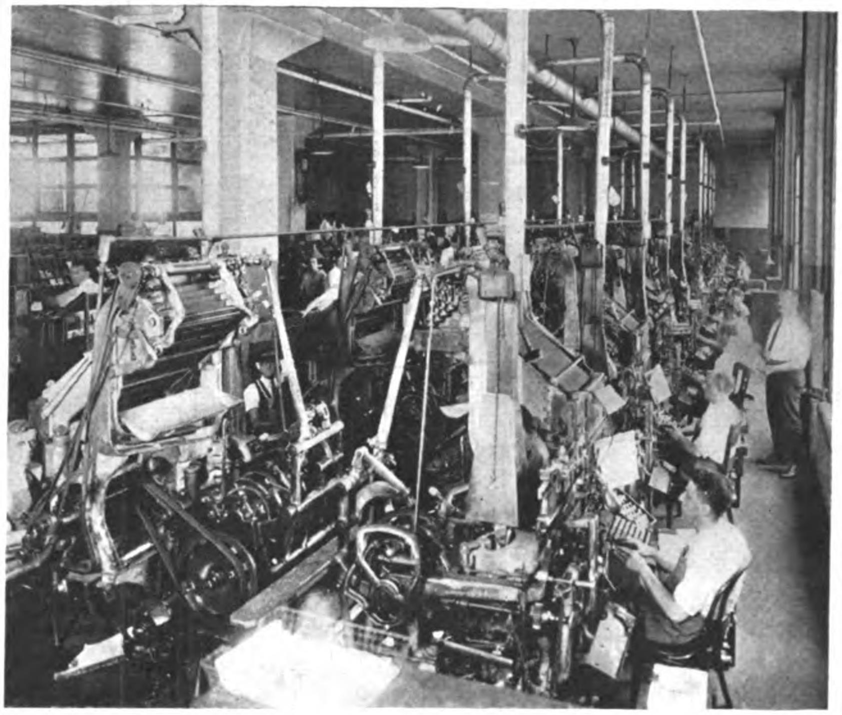

Linotypes

HEAR the humming and whirring, interrupted at intervals by harsh, clanking, metallic sounds? You are now in the fascinating linotype department. In front of the eighteen machines sit expert operators with typewritten copy before them. Skilled hands lightly brush the ninety-character keyboards; containers of molten lead move forward to complete what seems merely a gestured promise, and presto! a permanent line of shining metal type takes form before your eyes. Some 120,000 of these type lines are set every week.

How easy it looks—as easy as typewriting. But don't be deceived by those graceful, delicate motions. It takes five years of hard work to become a skilled operator. Linotype mistakes cannot be corrected with an eraser. A finger held too long on a single key would bring fifteen or twenty letters a-tumbling! Next week you'll see what becomes of these lines o' type as we continue through the House of McGraw-Hill.

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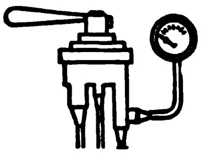

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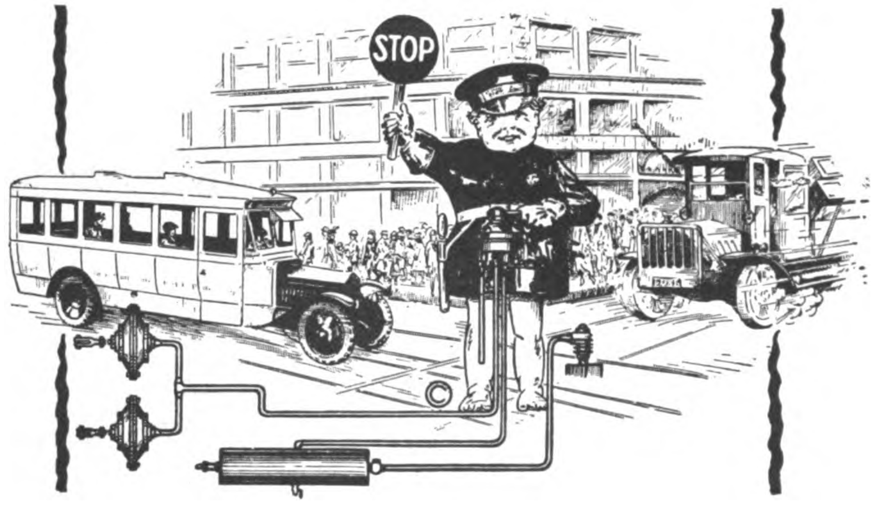
AUTOMOTIVE AIR BRAKES



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IF you can show that you have made every provision in your motor buses for the *protection of passengers,* you have a sure means of attracting *greater public patronage.*

The Westinghouse Automotive Air Brake gives the bus driver perfect control of his vehicle under all conditions and encourages careful driving by relieving him of unnecessary physical exertion and fatigue.

Passengers on buses equipped with Westinghouse Automotive Air Brakes are quick to appreciate this consideration for their safety.

ABILITY TO MAKE SHORTER STOPS MEANS GREATER AVERAGE ROAD SPEED AND GREATER DAILY MILEAGE

For further information, write or wire

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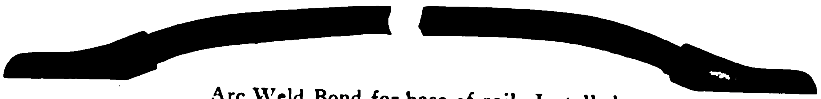
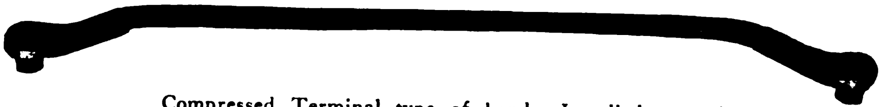
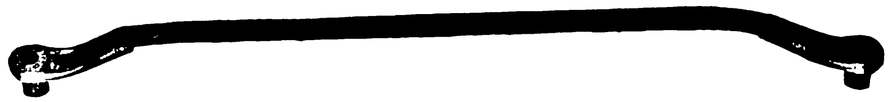


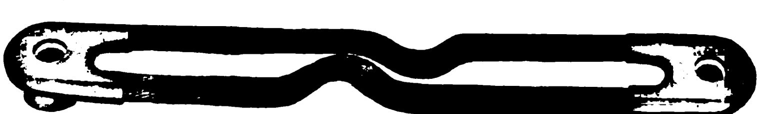
Arc Weld Bond for base of rail. Installed around splice plate. Wide angle welding scarf makes welding easy. Type AW-7.



Compressed Terminal type of bond. Installed around splice plate, also for cross bonding. Made in a variety of lengths and capacities. Type E-2.



Pin Driven Terminal type of bond. Similar to the E-2 except in the terminal. These bonds are furnished complete with steel expansion pins. Type EP-2.



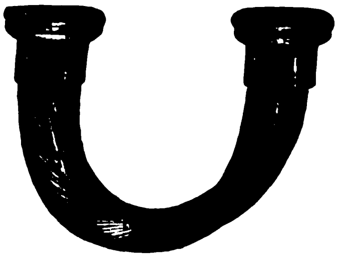
Pin Driven Terminal type of bond. For installing on web of rail under splice plate where space is limited. Made also in Compressed Terminal type. Cut shows special bond for very limited space. Type FP.

Good Bonding

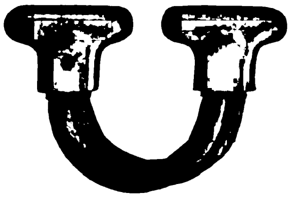
The O-B name has been associated with good bonding since the first days of electric railway operation.

Bonding with O-B Bonds is the economical way in the long-time average of efficient service. It is not always cheapest in the sense of first cost.

Arc Weld, Gas Weld, Compressed Terminal and Pin Driven types of bonds all are included in the complete O-B list. Each type has its field and each type reflects the O-B idea of supplying the best that modern manufacturing and engineering can produce.



Gas Weld Bond. A highly efficient gas weld bond for application to ball of rail. Has steel armored terminals. Type ST-2.



Arc Weld Bond for ball of rail. Has a wide angle welding scarf like the AW-7. Type AW-8.

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Mansfield, Ohio, U.S.A.

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They enable you to safeguard profits, eliminate hazards and reduce insurance cost.

Business executives of many of our large corporations have used this service profitably.

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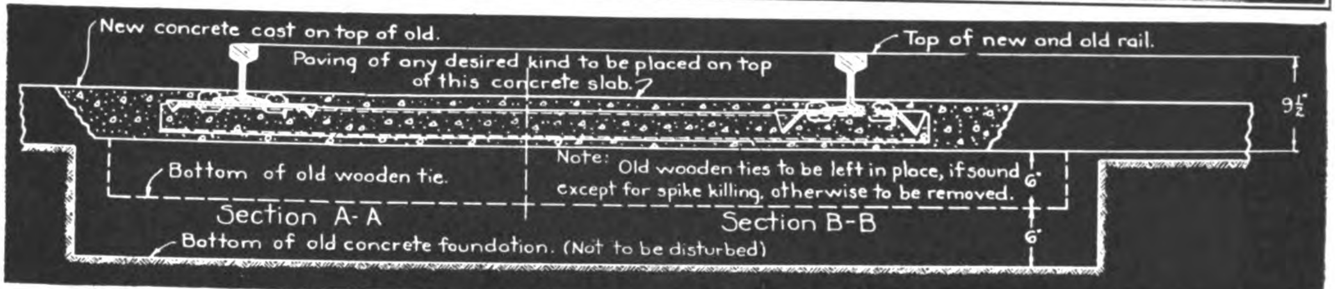

New concrete cast on top of old.
Top of new and old rail.
Paving of any desired kind to be placed on top of this concrete slab.
9½"
Bottom of old wooden tie.
Note: Old wooden ties to be left in place, if sound except for spike killing, otherwise to be removed.
6"
Section A-A
Section B-B
6"
Bottom of old concrete foundation. (Not to be disturbed)

In 1921 and 1922 Twin Ties Saved 29,496 Lineal Feet of Old Concrete Track Base

WHERE worn out track which has a concrete base under wood ties is to be rebuilt, Steel Twin Ties fit every case with a saving in first cost which has been as high as $26,928 per mile.

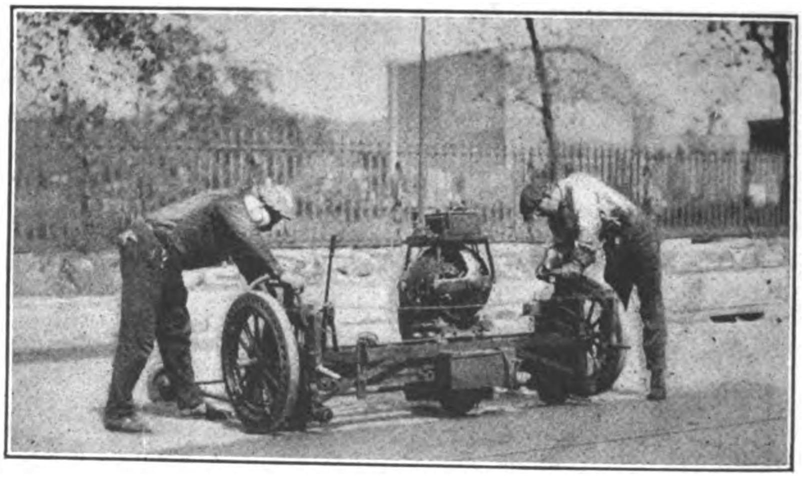
The conditions vary, of course, as to rail heights and clearances. For instance, in the case shown in the drawing, a clearance of 3½ inches was available; while in the job shown in the photograph the clearance was only 1¼ inches.

Before considering the removal of old concrete base let us prepare a suggestion and estimate for rehabilitation with Steel Twin Ties.

THE INTERNATIONAL STEEL TIE CO.
Cleveland, Ohio

Steel Twin Tie Track

"UNIVERSAL" Rotary Track Grinder



These unique features make it superior

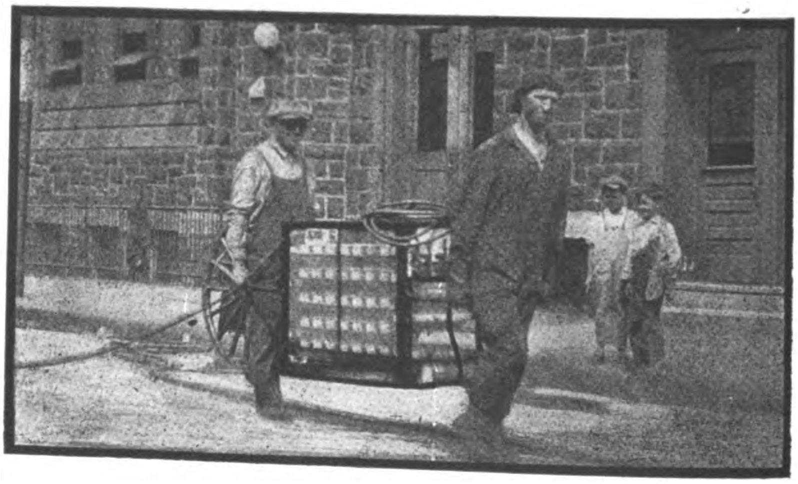
A tilting grinding wheel, adjustable to any angle to conform to rail head, groove, or gauge line.

Outboard bearing on grinding wheel arbor gives firm support to the rapidly rotating wheel.

Adjustable outrigger.

Large rubber-tired derail wheels,—can be drawn behind a truck to the job.

AJAX Electric Arc Welder



These specifications tell the story

Weight—only 155 lbs.
Dimensions—18 in. x 28 in. x 36 in.
Capacity—333 amps. at 600 volts.
—200 amps. at 300 volts.

Equipment—Electrode Holders.
—Trolley Pole.
—Cables.
—Face Shield.
—Canvas Cover.

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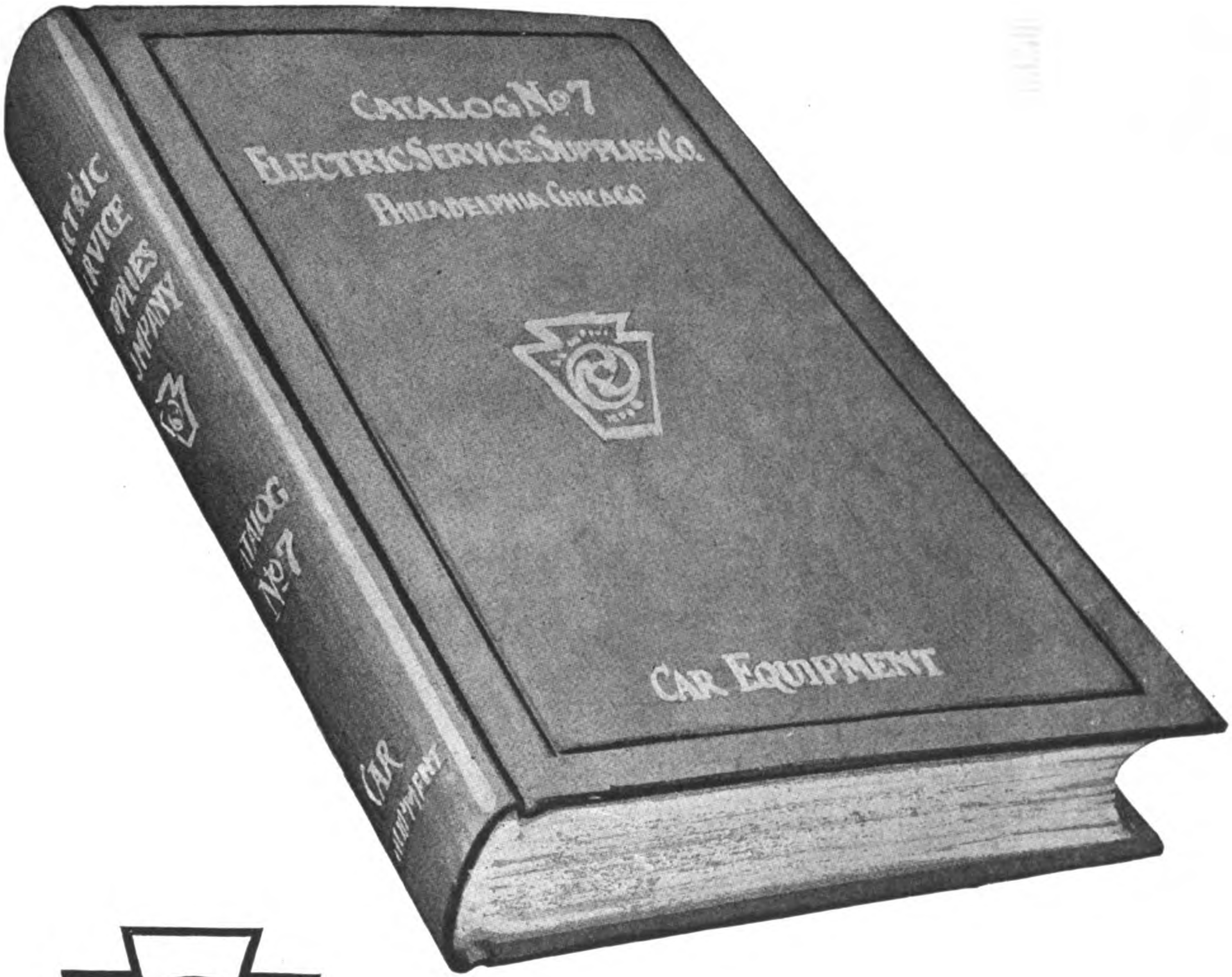
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PHILADELPHIA CHICAGO
CAR EQUIPMENT
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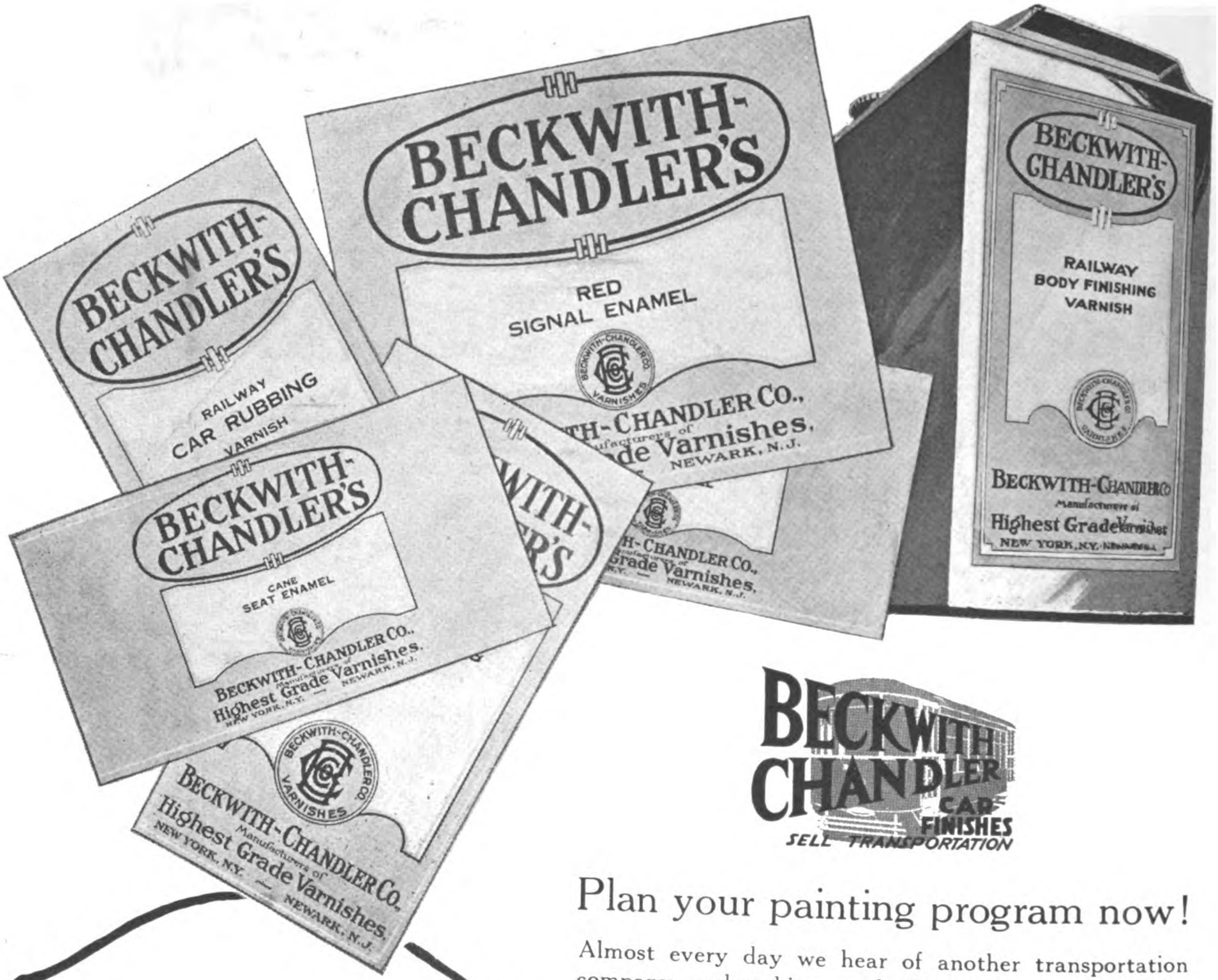
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RAILWAY BODY FINISHING VARNISH

BECKWITH CHANDLER CAR FINISHES
SELL TRANSPORTATION

Plan your painting program now!

Almost every day we hear of another transportation company undertaking to build up its patronage by painting its cars. Some are steam railroads, others are bus companies, but the electric car companies are going at it, too. Are you one of them?

Beckwith-Chandler Paints and Varnishes are being widely used in carrying out these programs. Their reputation for durability, adaptability and real economy is thoroughly established. Our regular customers include many of the leading roads of the country.

Our experts with wide experience in the railway car painting field are ready to serve you. They will gladly consult with you, furnish samples, and show you what other roads have actually accomplished with Beckwith-Chandler car finishes.

We have a paint or varnish for every particular requirement. See list in panel at left.

Write for further information.

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Durable Railway Enamels in different colors
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Cane Seat Varnish
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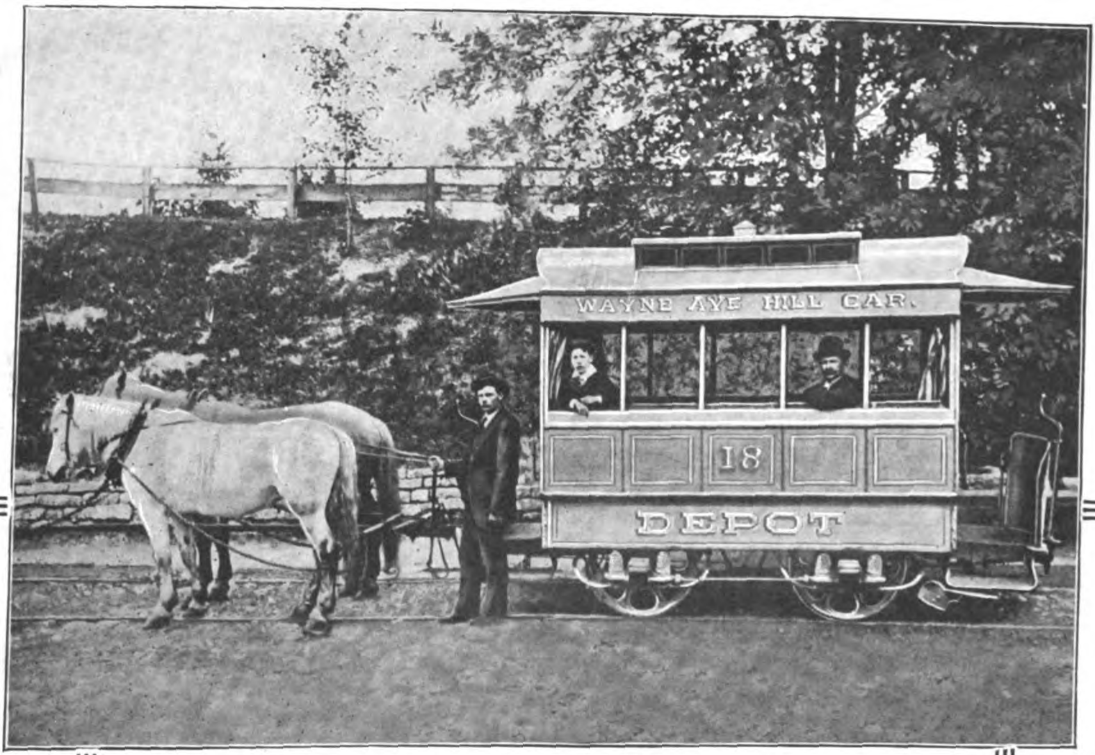

Whizzing along at 8 miles an hour

Fast enough and safe enough fifty years ago!

Crawling at 30 miles!

To the impatient rider of today the fastest cars seem slow. Stops and starts pull down the average speed. Riders risk life and limb to save a second.

Modern equipment makes high speeds safe. National Pneumatic door and step-equipment safely cut out delays at every stop.

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Door and Step Operating Mechanism Motorman's Signal Lights
for satisfactory service and for lowest maintenance costs.

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Originators and Manufacturers
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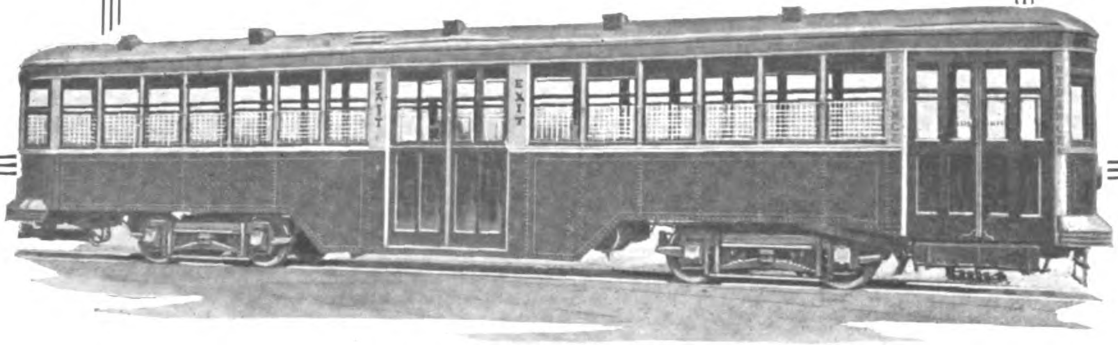

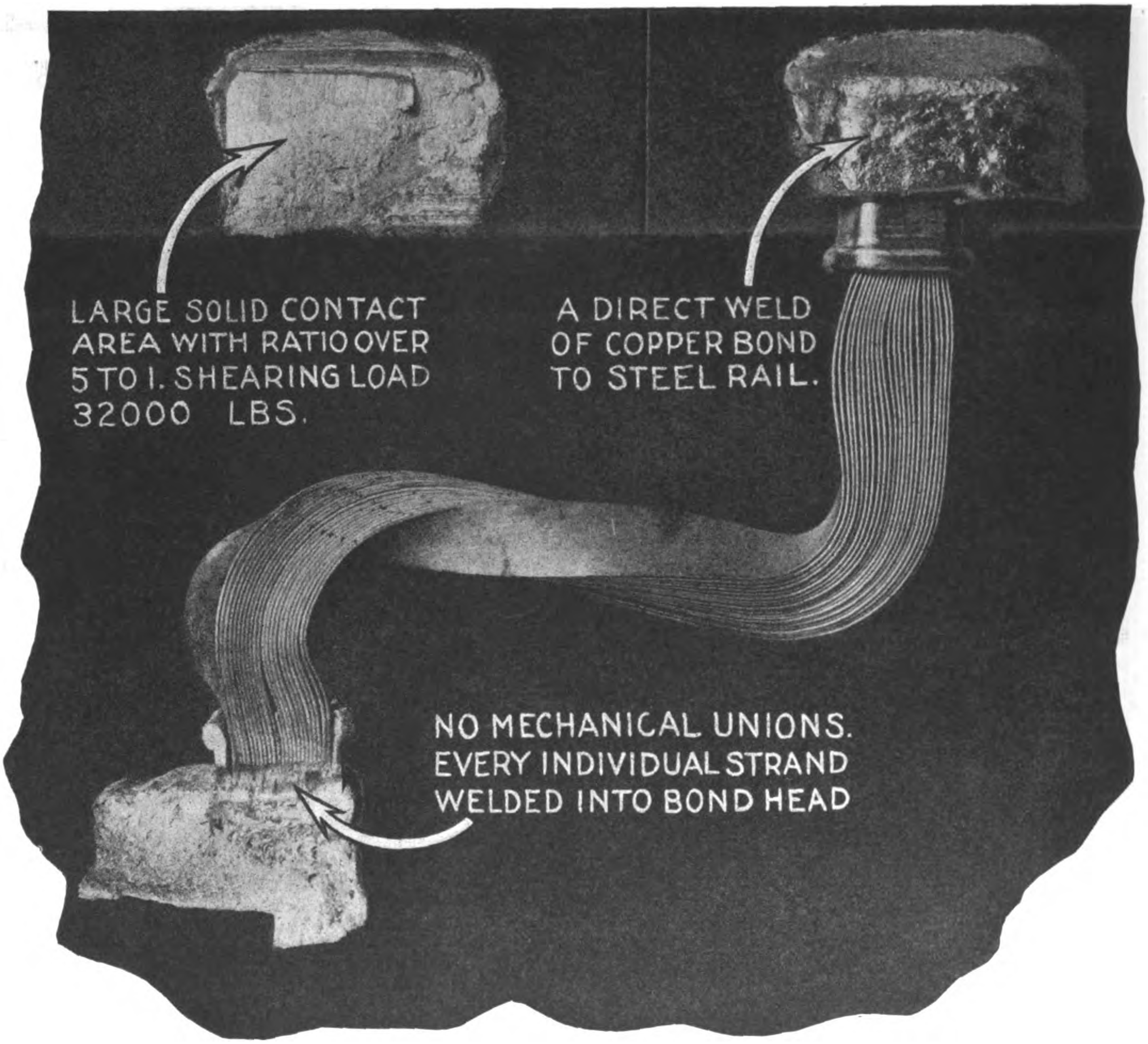
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A DIRECT WELD OF COPPER BOND TO STEEL RAIL.
NO MECHANICAL UNIONS. EVERY INDIVIDUAL STRAND WELDED INTO BOND HEAD

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1. Preliminary rail grinding unnecessary.
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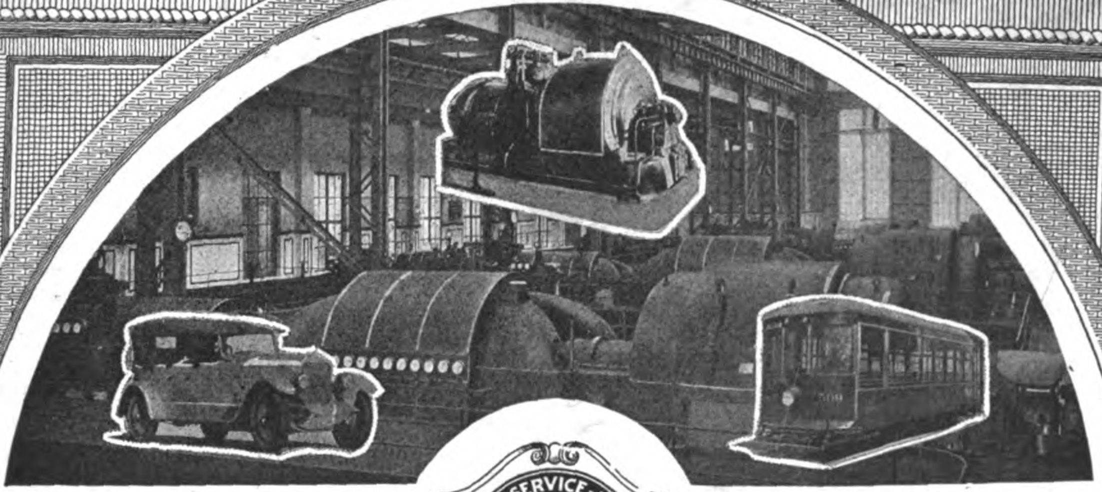
4. Copper bond is welded direct to steel rails.
5. Great strength of weld of copper bond to rails.
6. Permanent union of bond strands into bond head.
7. Copper only is path for current from rail to rail.
8. Maximum power savings.
9. Low cost.

It Pays to Use UNA Bonds

Rail Welding & Bonding Company
Cleveland, Ohio



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GSO
GALENA-SIGNAL OIL CO.

The Logic of Lubrication

In the operation of cars, engines and power transmission units, lubrication is first, last and always a *necessity*. It is not a matter of choice; without lubrication, your equipment is powerless—worthless.

But the quality and efficiency of your lubrication *is* a matter of choice. Not only the service you secure from equipment, but its own length of life, depends upon your selection.

The first cost of high-grade lubricants naturally must be more than that of the ordinary kinds, due to the higher priced materials and more complete processes that enter into their manufacture. The question to you must be, "Are they worth the difference?"

What is the opinion of the best engineering authorities on this subject? What is the advice given in the instruction book when you bought your automobile? *"Use the very best lubricant obtainable—it will pay you many times its difference in cost."* The more expensive the type of machine, the more truly this counsel applies.

Galena Oils are the highest grade street railway lubricants manufactured. Their matchless efficiency and ultimate economy are shown in their splendid service on hundreds of electric railways and power plants in all parts of the United States.

These properties do not consider Galena Oils a luxury, but *Galena lubrication a necessity* to efficient operation. The small difference in cost is not looked upon as an expense, but as an *investment*, that has invariably returned large dividends in better service and decreased maintenance costs.

"More miles to the pint,
Better service to the mile!"

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New York - Franklin, Pa. Chicago
and offices in principal cities

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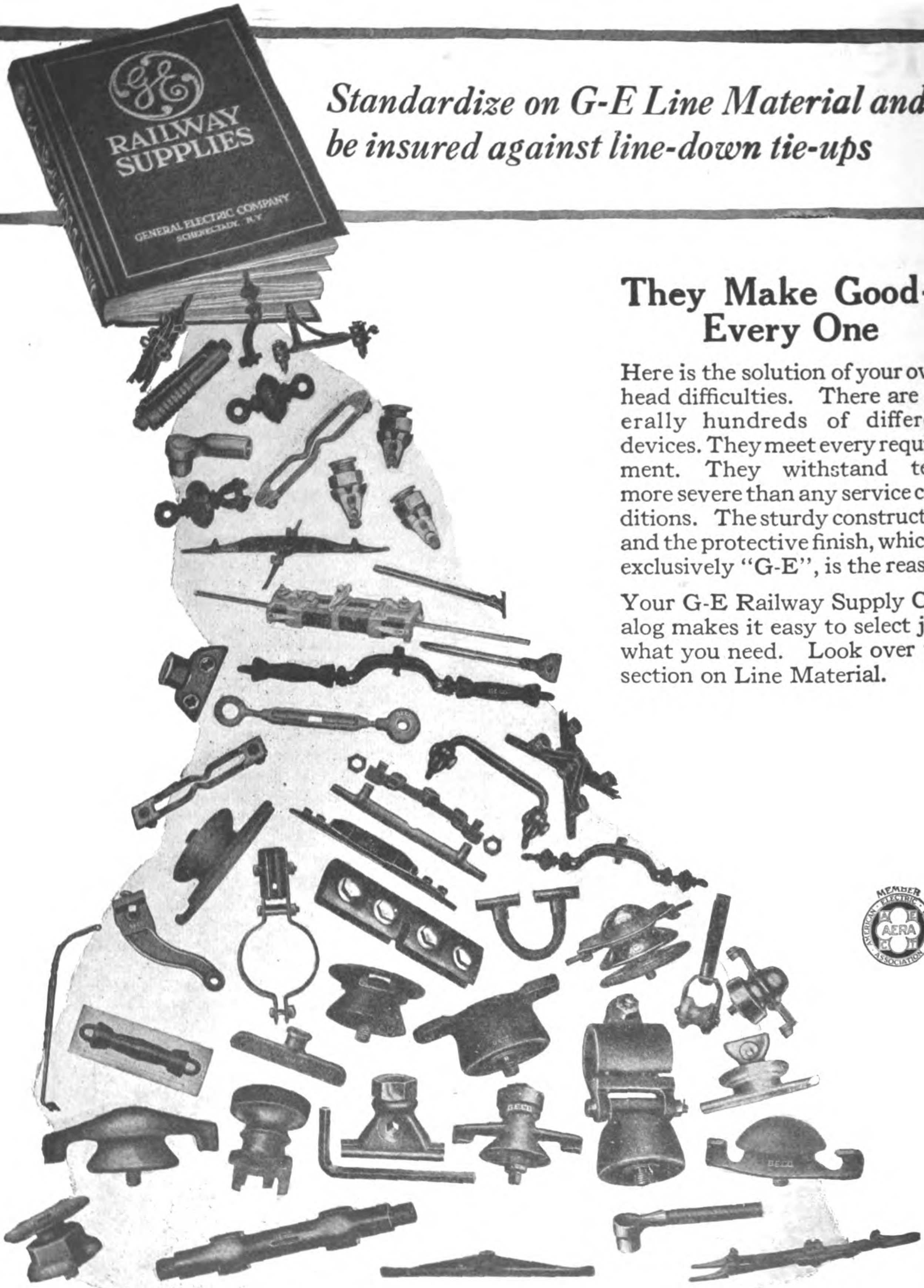

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They Make Good—Every One

Here is the solution of your overhead difficulties. There are literally hundreds of different devices. They meet every requirement. They withstand tests more severe than any service conditions. The sturdy construction and the protective finish, which is exclusively "G-E", is the reason.

Your G-E Railway Supply Catalog makes it easy to select just what you need. Look over the section on Line Material.

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Schenectady, N.Y.

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all large cities

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New York, Saturday, July 14, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

Henry W. Blake and Harry L. Brown, *Editors*

Volume 62
Number 2

Government Regulation for the Coal Industry

THE first report of the United States Coal Commission, covering the anthracite field, is important to electric railways more for what the report indicates will later be said about the bituminous field than for what the report now made public contains. It is of interest particularly for the definite conclusion reached that this industry should be placed under public regulation, though any recommendation as to the form this should take is deferred. Another important recommendation is that there shall be open publicity for all the coal operators' accounts.

The commission speaks of the anthracite monopoly plainly and to the point when it states that the guiding principle must no longer be maximum profit to owners but maximum service to public; and again, when it calls attention to the fact that some of the material supplied to the commission by both operators and the miners' union was intended to inflame the public mind for or against one of the parties. This latter bespeaks the attitude of mind with which the coal men submitted to the investigation, though this attitude has improved as the work went along.

If one admits that the railroads should be regulated, it is difficult to find reasons why the coal industry should not be, for it touches the interest and welfare of everyone the country over with almost the same degree of importance. But regulation is not desired by any industry. It always is a hampering incumbency, as it is so often administered in an ill-advised way. Coal men have had every opportunity, however, to avoid this, had they taken a lesson from the public utilities and the carriers. The men in these industries have learned that the best way to keep government out of business is to sense public demand in advance of governmental requirement. In other words, having regulation, they are now making the most of it by increasingly sincere endeavor to make service the paramount duty in running their businesses.

The report is significant in another respect. Having investigated all the facts, the commission comes out firmly against government ownership and operation. The coal industry is one that many have thought was particularly suited to socialization. But the commission concludes that the public interest will be best served by private operation if supervised, not managed, by governmental agency. This makes the third time in the last four years that a similar investigation by a government body, with only public interest in view, has brought the conclusion that private operation under proper control is the best way of conducting these businesses on which the public is closely dependent. The Esch-Cummins act relating to the railroads and the Federal Electric Railways Commission report were the two previous instances.

The Coal Commission report seems to give a perfectly sound finding. It is fair, though it speaks plainly as to the faults of the industry. Its two principal recommendations—regulation and open publicity of accounts—will go a long way toward improving conditions. In general, it can already be seen that the fact-finding commission is doing a very constructive piece of work.

N. & W. Men Enthusiastic Over Electrification Performance

THERE is no uncertainty in the remarks of N. D. Maher, president of the Norfolk & Western Railway, regarding his experience with electric motive power, as chronicled elsewhere in this issue. President Maher is an enthusiast for electrification in general and for the single-phase-three-phase system in particular because the transportation requirements on his road are being met admirably by this means of operation. That is all he is interested in. Eight years or more ago a dozen electric locomotives replaced more than three times as many Mallets, did work that the Mallets could not do, and were rebuilt to eliminate weaknesses while they were doing it.

These engines played an important part in winning the war. They transported millions of tons of the famous Pocahontas coal on its way to the seaboard, where it was transferred to naval vessels and merchant ships. Their reliability, thus convincingly demonstrated, appealed increasingly to the N. & W. operators until today confidence in the adequate ability of the electric zone to deliver coal without delay to the classification yard at Bluefield is evident among the men throughout the zone itself and in the executive offices at Roanoke. The war was a real test for the N. & W. electrification, but it had another during the shopmen's strike. So reliable was the service, however, even under these conditions, that not a train was refused in the electric zone.

The confidence in the reliability of electric operation is showing itself in a practical way by substantial extensions, and more are being planned. The work just completed and that to be completed in 1923 practically doubles the electrified mileage. The new work is being carried out substantially along the lines laid down ten years ago. There are differences in detail, to be sure, but there is no thought of abandoning the constant-speed motor, which seems well adapted to the local conditions. The overhead contact system, with steel cross-members supported on steel columns, has also been found satisfactory and will be continued on the new construction.

It was rather natural, of course, that the Virginian Railway should adopt the same system as used on the N. & W. since the two roads are such near neighbors over a large part of their routes. Having the same system gives the great advantage of interchangeability of motive power and enables either road to utilize the track of the other in emergencies. But these advantages doubtless would have been nullified for the Virginian management had there been any fear of unreliability in operation.

Rail Wear Is the Result of Several Causes

THE subject of rail wear is one that is of increasing importance on many street railway systems. So much attention has been paid, in recent years, to the problem of obtaining permanent track structure that this has been attained to a considerable degree. Thus, it now develops that the wear on the head of the rail may determine the life of the track in some cases. This is the conclusion that has been reached by Charles H. Clark, as given in his article in this week's issue, on measurements taken on tracks in Cleveland.

While this may be true with the type of construction and traffic conditions that prevail in Cleveland, there are other factors that enter into the determination of the effective life of steel rails as a general proposition. The relationship of these factors, however, is not very generally known. In many cases, joints are at the point where the wear is greatest and which limits the life of the remainder of the track. A loose joint quickly allows the rail to bend out of shape, which, in turn, results in a hammering on the rail end, soon getting the track out of alignment.

Even when the track is well constructed, there is another factor entering into rail wear, which was not considered in this series of tests. The measurements made would indicate, roughly, that the wear on the rail was proportional to the number of car wheels passing over it. However, observations made in Chicago several years ago showed that on certain busy streets, where car service was light but vehicular traffic heavy, the rail wear was as great as on lines with a considerable amount of street car traffic.

A comparison of the actual amount of the wear caused by vehicles with the wear caused by the passage of car wheels will depend on the relative movement of the two classes of vehicles, so that it cannot be determined unless all the characteristics are known. A study of some of these other elements under the conditions existing in Cleveland, or similar cities, would do a great deal to clear up the question of rail wear and its effect on the life of tracks.

The Opportunity for the Traffic Engineer

THE work of the traffic engineer on the larger railways has become more and more important during the past few years. This position is called by various names on various railways, but it should not be confused with the position of traffic agent or passenger agent. The work of the traffic engineer is to study the problem of operation from the point of view of the engineer. The description in last week's issue, page 13, of the way in which one company reconstructed the system for making delay reports illustrates an important service that this branch of the railway organization can perform. An article which was published recently telling of schedule revision at Toronto is another illustration.

An old proverb tells of the man who could not see the forest because of the trees. A railway transportation department is often in just such a position. The operation of the cars presents a never-ending problem, but because they are so close to it the transportation men are sometimes unable to see its larger aspects. The traffic engineer, on the other hand, free from the duties of keeping the cars moving, can view this problem from a distance and achieve a perspective often quite impossible to a man in the transportation department. Moreover, when a particular phase of the problem becomes specially troublesome, the traffic engineer is able to study it without interruption until some solution of the difficulty is arrived at. This could not be done in the transportation department because the vicissitudes of operation are such that a new problem often becomes distressingly acute before the ultimate solution of the first problem is reached.

Unfortunately, the fact that the electric railways maintained a successful existence for many years before the traffic engineer came into being leads some of the older men in the industry to view with distrust this recently established department. Then, too, the occasional use of a department of traffic engineering as a sort of secret service to investigate the methods of other departments and report on them may tend to embitter the rest of the organization. The true function of a traffic engineer, however, is different from that. His job is not to "show up" a department, but to help it. His job is to investigate every phase of the operation, analyze the results of these investigations and recommend such changes as may tend to improve conditions.

Every sizable company ought to have a traffic engineer, for the savings possible in the average transportation department are greater than can be derived in almost any other phase of railway work.

Exhibits for the Accountants

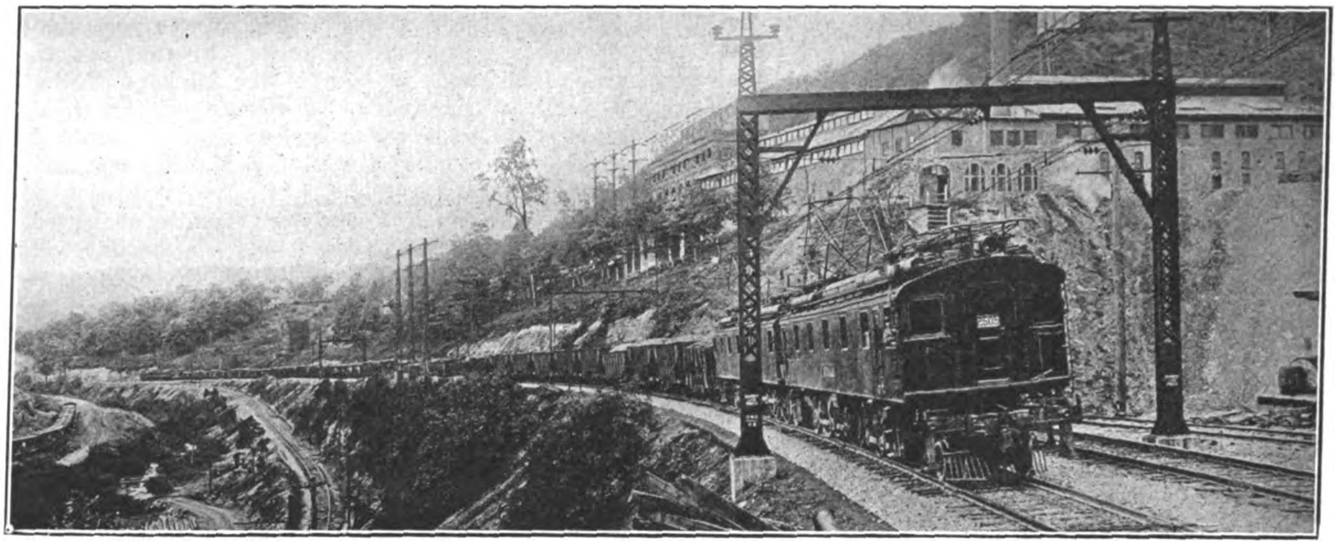
AT PAST conventions of the American Electric Railway Association there have been practically no exhibits of equipment of interest to the accountants who attend. There was a time, of course, when there was practically nothing of a manufactured nature to show these men. But in recent years labor-saving devices of numerous designs and remarkable performance have invaded the accounts' province and have introduced economies in labor and time that ought to be fully known to every electric railway accountant. These machines are being used at present by electric railways only to a very limited extent, part of the reason probably being the absence of these devices at the one big showplace where railway men foregather to learn of such things.

Investigation discloses the information that there are more than fifty manufacturers of machines and some twenty manufacturers of loose-leaf forms, accounting books and supplies, who produce something of interest to electric railway accountants. These comprise such devices as bookkeeping and billing machines, tabulating machines, adding machines, coin counting and coin sorting and wrapping machines, various calculating machines, and so on.

To these manufacturers, the convention exhibit at Atlantic City, Oct. 8 to 13, offers the best opportunity of the year, in fact the only opportunity, to demonstrate and explain the functions of their machines and the savings possible to a large number of men from all over the country in the space of a few days. The accountants are eager for new ideas in the conduct of their departments, and it is believed they would show a keen interest in exhibits at Atlantic City pertinent to their own work.

N. & W. Electrification a Good Investment

In an Interview with a Representative of This Paper, N. D. Maher, President Norfolk & Western Railway, Tells Why He Is Enthusiastic for Electric Operation and Believes that It Can Be Used Still More Extensively with Profit



A 270-Ton Locomotive at the Head of a Coal Train on the N. & W.

N. D. MAHER, president of the Norfolk & Western Railway, is one of those progressive railroad men who has sensed the possibilities of railroad electrification in general and on his own property in particular. He has been able to demonstrate the soundness of his convictions, for eight years of electric operation on the N. & W. has postponed enormously the necessity for track and tunnel additions and in addition has proved economical as to running costs.

A representative of the ELECTRIC RAILWAY JOURNAL called on Mr. Maher with a view to asking him a few questions on the subject of heavy electric traction. The answers to these questions showed conviction that there is an assured place for the electric locomotive in the movement of heavy trains under conditions such as obtain on the N. & W.

Asked as to the reasons for electrifying originally, Mr. Maher explained that the railroad was confronted by the necessity for increasing track capacity in the mountain section where the coal fields are located. The "neck of the bottle" was the tunnel through which the track, elsewhere double, is single. The double-tracking of this tunnel was a formidable undertaking. Electrification was the logical solution of the problem and the expenditure of $3,000,000 for electrification was justified by the expected increase in capacity, not only in the tunnel but over the system as a whole. Results have been as expected, the ability of the road to move tonnage having been increased 60 per cent in the mountain section and at least 20 per cent over the system as a whole.

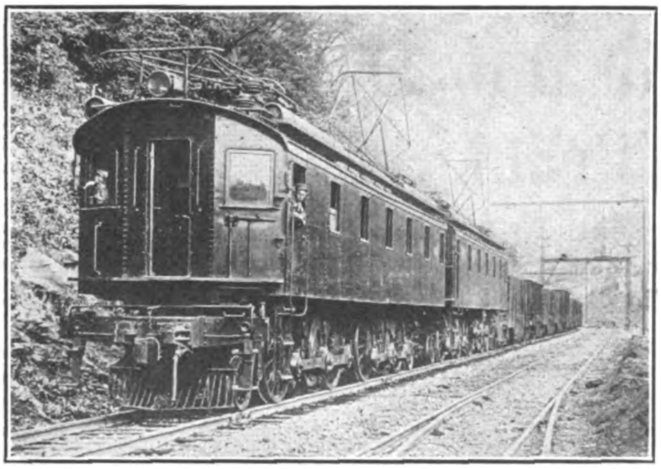
RELIABILITY AN OUTSTANDING FACTOR OF ELECTRIC OPERATION

In reply to a question as to the characteristics of the N. & W. electric locomotive which impressed him as most useful, Mr. Maher enthused over its reliability in getting over the line. Not only is the regular speed which it makes a desirable feature, but its ability to hold to this constant speed under all variations in load and grade is admirable.

Maintenance costs on the N. & W. locomotives, generally known to have been high, were discussed. They were very high at first, Mr. Maher said, but this was not unexpected. The railroad and the manufacturer made mistakes in the designs, but this was to be expected in view of the pioneer nature of the installation; it was part of the game. Correcting the defects was expensive for both, Mr. Maher pointed out, but the mistakes were corrected and maintenance costs are now as low as any other under conditions which are comparable.

Breakdowns were at first troublesome. The weak parts have been made stronger and the new machines now under construction embody the results of the experience with the earlier ones. But in the meantime Mr. Maher feels that the traffic has been handled in a wonderful manner and the development work, carried out under severe operating conditions, was merely an incident.

Mr. Maher pointed out that he is not interested in the technical details of the electrification. He and the transportation department formulated the requirements as to the movements of trains and put it up to the engineers to meet these requirements. Every opportunity was afforded, but the requirements had to be met, and they were met. The faith of the railroad in electric operation is shown by extensions now under way. What is known as the Wilcoe-Farm extension, begun just prior to the war and now practically complete, adds 16 route miles, or 51 single-track miles, to the electrification, and this year a further extension from Farm to Iaeger, including the Auville yard on the Dry Fork branch, has been authorized. This will add 22 route miles, or more than 50 single-track miles.



One Leading Locomotive and a Pusher Can Take 3,250 Tons Up a 2 per Cent Grade at 14 M.P.H.

In Mr. Maher's opinion the application of electricity on the line all the way to Norfolk would be a paying proposition.

SELECTION OF SINGLE-PHASE BY VIRGINIAN RAILWAY A WISE ONE

Owing to the interest in the decision of the Virginian Railway, which closely parallels the N. & W., to electrify a long section at 11,000 volts single-phase, Mr. Maher was asked as to his opinion of the wisdom of this. He replied that it is a wise move in several ways. It will be a paying proposition, as conditions are even more favorable for electrification than on the N. & W., the Virginian being largely a single-track road. Then the possibility of interchanging equipment in emergency makes it desirable for the two roads to use the same system. The Virginian will benefit more from this assurance due to its having but one track. As regional director of railroads during the war Mr. Maher had jurisdiction over both roads and stated that he thus realized clearly how both will benefit by co-operation. In regard to the length of the projected Virginian electrification, which is more than 200 single-track miles, he said, this is logical and the N. & W. might also well electrify as far as Roanoke with good assurance of an excellent return on the investment.

As to the relation of the power plant to the electrification problem on the N. & W., Mr. Maher said that the logical thing is to add to the present electrification to a point which will load the power plant at Bluestone to an economical limit. Work now under way will do this. Projected extension to the west, if carried out, would involve another power plant properly located and loaded to an economical extent.

COAL SAVING IS SECONDARY BUT CONSIDERABLE

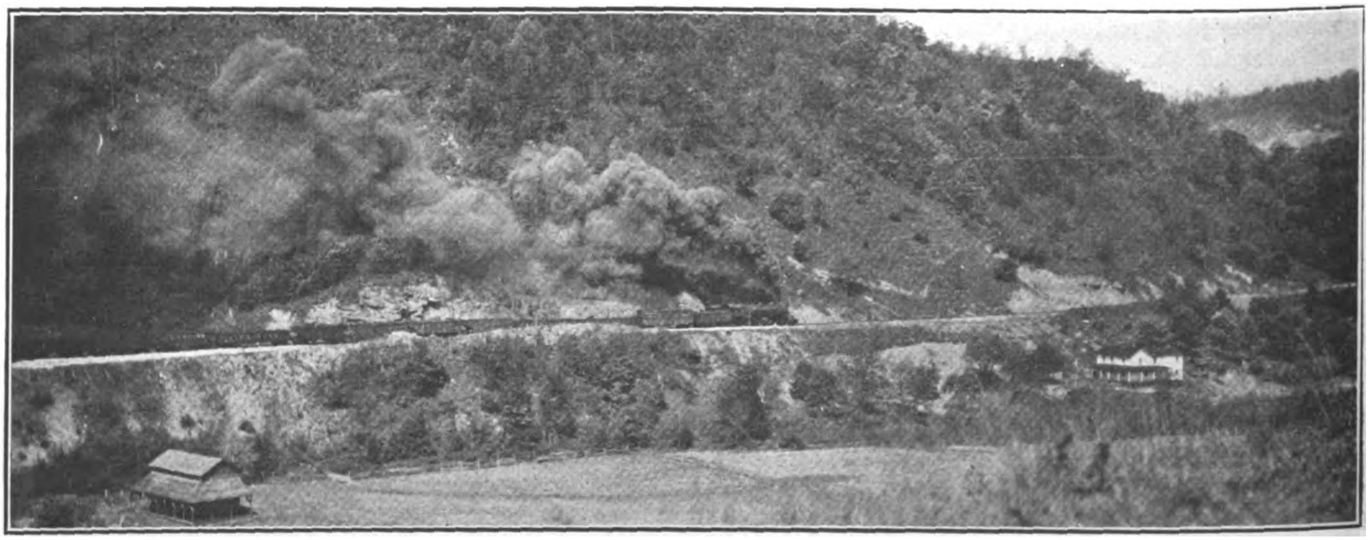
Mr. Maher also spoke of the effect of coal cost on the proposition. While the electrification was undertaken entirely independently of fuel saving, it was profitable from the power standpoint also, even with the pre-war coal cost of 85 cents per ton in the bunkers of the power plant at Bluestone. Experience on this road shows that the electric operation saves about one-third in fuel cost as compared with the Mallet compound engines.

About 12,000 tons of coal per month are used at Bluestone Junction at present and the amount will probably be increased to from 14,000 to 15,000 tons when the extension to Iaeger is complete. Coal now costs about $2.50 per ton, a monthly coal bill of, say, something over $30,000. There is thus a saving of $15,000 or more per month as compared with the steam engines, which will be increased to, say, $18,000 when the extension to Iaeger is completed. In addition to this there will be power plant economies due to the greater output of the station.

Steam Railroad Accident Statistics

STATISTICS on accidents on steam roads during 1922 have just been published by the Interstate Commerce Commission, Bureau of Statistics. The total number of persons killed during the year in all steam railroad casualties was 6,326, of which 1,657 were employees, 203 were passengers, 2,499 were trespassers, and 1,967 were not included in any of these three classifications. The total number of persons injured was 134,872, divided among the four groups mentioned in the following order: 117,197 in the first, 6,712 in the second, 3,129 in the third, and 7,834 in the fourth. The figures given include non-train accidents. Among the details shown are a total of thirty-seven collisions with trolley cars, in which two persons were killed and 169 injured.

The Interstate Commerce Commission calls attention to the fact that highway grade crossing casualties continue to increase.



The Virginian Railway, Operating Near the N. & W., Will Also Be Electrified on the Single-Phase System

Wear on Rail Head May Determine Life of Track

Measurements of Many Rails in Cleveland Track Show Relative Wear at Stops Is Much Greater than the Average—Relation Shown Between Numbers of Wheels Passing and Rail Wear

By Charles H. Clark
Engineer Maintenance of Way, Cleveland Railway

AN OLD adage among electric railway men is "The life of the track is the life of the joints." Let us see if it is. One company that installs joints says: "The first cost is the last cost," and that the joints are the same as the rail. Several modern types of joints are considered capable of equally good service. We are down to the proposition, therefore, that the life of the track is practically the life of the head of the rail and the structure combined.

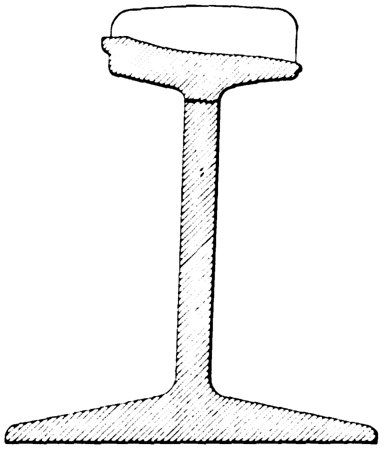
Wear on the rail head is caused by the number of cars that pass over the rail, together with their speed and weight. Wear may come from the rolling of the wheel on the rail, from the grip of the contact between wheel and rail in acceleration and retardation, or from actual slipping of the wheel over the rail. When moving, a car possesses kinetic energy equal to one-half its mass times the square of the speed. To stop the car this kinetic energy must be absorbed. This is accomplished by setting the brakes, causing an impeding friction that is transferred through the wheels to the track. These various actions cause wear on the car wheels, the brakeshoes, and the track. Other things being equal, it may be considered that the wear on the track is proportional to the kinetic energy dissipated in stopping the car.

The average schedule speed of a city car in service such as that in Cleveland is perhaps 11½ m.p.h., but to make such a schedule, including stops, maximum speeds in the neighborhood of 25 m.p.h. must be attained. A 40-ton interurban car, hauling freight or passengers over the same tracks, does not make all the stops that a city car does, but since it cannot pass the city car it cannot attain an average speed to exceed, say, 15 m.p.h. It may be calculated that the 25-ton car going 25 m.p.h. has a kinetic energy of 1,044,200 ft.-lb. as against 601,100 ft.-lb. for the 40-ton car at 15 m.p.h. This indicates that the rail wear from the city car may be the greater, despite the extra weight of the interurban cars.

MEASUREMENTS MADE ON RAILS IN PLACE TO DETERMINE AMOUNT OF RAIL WEAR

In order to determine the effect of these factors on the wear of the rail, careful measurements were made of certain rails in service. The results are shown in the accompanying table. An examination of the figures show that on Jan. 1, 1922, track that had been in service for nine years, with a total passage of more than 20,000,000 wheels, showed a wear of 7/16 in. at car stops and ¼ in. between stops. On another piece of track in another section of the city, which had been in service twenty-one years with a total passage of 19,000,000 wheels, there was found to be the same wear—7/16 in.—on the rail at car stops and ¼ in. wear between stops. The life in these two cases agrees closely, although in the first instance interurban cars used the tracks, while in the other there were none but city cars.

From this investigation the inference may be drawn that the life of the track is determined, to some considerable extent, from the service on it. Since 1903 this company has been relaying its tracks with the best modern construction known at the time, and the last twenty years have shown that this position has been well taken. With increasing car mileage we should expect the life of the track to decrease, all other things being equal. The accompanying chart shows the increase in the average number of cars operated per mile of track for the years 1911 to 1922, inclusive, and also gives the average life in years of the track removed. Cumulative averages for the number of cars per mile and the average age of the track are also given for each year, beginning with 1909. These cumulative averages show the relative wear, although of course a considerable amount of the track removed in the past fifteen years had been built a considerable time prior to the earlier date. An inspection shows that the track laid previous to 1902, and which was removed from ten to twenty years thereafter, showed a decreasing length of life, while the track which was laid after 1902, and removed during the same period of from ten to twenty years, showed an increasing length of life, although the service over it was materially greater than for the older design of track. While the speed of the cars has gone up somewhat, general street traffic has increased materially, causing a great deal more congestion and necessitating more stops. For this reason the maximum speeds also may be higher than they were formerly.


Wear Resulting from 21,000,000 Car-Wheel Passes at a Car Stop with Lorain Rail Section 95-400 in Eight and One-Half Years

The table shows that more than 30,000,000 car wheels have passed over certain track in the downtown district in nine years, and this is still in use. This is the solid concrete steel tie construction. In another part of the

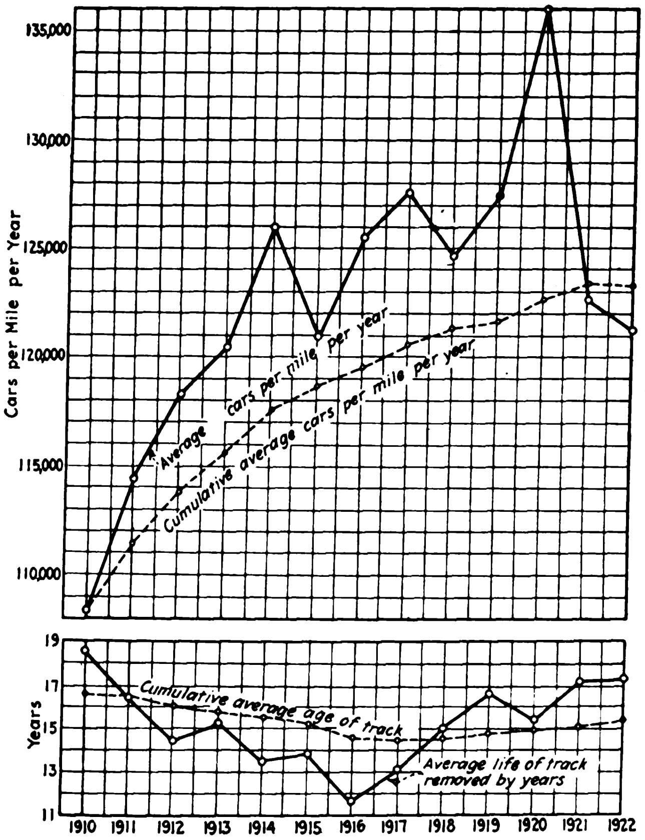
Service Records of Various Track Constructions in Cleveland

Between	And	Ft. Single Track	Rail Section No.*	Kind of Ties	Foundation	Year Laid	Years in Service	No. of Cars Passed Over	Rail Wear At Car Stops	Rail Wear Between Car Stops
BROADWAY LINE										
On Broadway										
Ontario St.	Orange Ave.	1,944	141–395	Oak	Crushed Stone	1904	18	†3,853,723	1/2 in.	1/4 in.
On Pittsburgh Ave.										
E. 27th St.	E. 32nd St.	2,025	95–400	Carnegie	Concrete	1916	6	2,105,476	1/16 in.	1/8 in.
On E. 34th Street										
Trumbull Ave.	Broadway	2,148	103–426	Carnegie	Concrete	1909	13	†3,853,476	1/16 in.	1/2 in.
On Broadway										
E. 34th St.	E. 55th St.	10,875	100 lb. ARA	International	Concrete	1916	6	2,105,476	1/8 in.	1/16 in.
E. 55th St.	Union Ave.	3,141	95–400	Carnegie	Concrete	1917	5	1,758,181	1/16 in.	1/8 in.
Union Ave.	N. & S. S. R. R.	11,171	95–400	Carnegie	Concrete	1917	5	1,342,934	1/8 in.	1/8 in.
N. & S. S. R. R.	Harvard Ave.	1,359	95–400	Alternate‡	Concrete	1917	5	1,342,934	1/8 in.	1/8 in.
N. Bd. Harvard	C. & P. R. R.	365	95–400	Oak	Crushed Stone	1917	5	2,319,188	1/16 in.	1/8 in.
S. Bd. Harvard	C. & P. R. R.	365	95–400	Oak	Crushed Stone	1917	5	1,370,188	3/16 in.	1/8 in.
N. Bd. C. & P. R. R.	Miles Ave.	975	95–400	Alternate‡	Concrete	1917	5	2,319,188	1/16 in.	1/8 in.
S. Bd. C. & P. R. R.	Miles Ave.	975	95–400	Alternate‡	Concrete	1917	5	1,370,188	1/16 in.	1/8 in.
On Miles Ave.										
W. Bd. Broadway	E. 93rd St.	539	95–400	Oak	Crushed Stone	1915	7	2,827,648	1/16 in.	1/16 in.
E. Bd. Broadway	E. 93rd St.	539	95–400	Oak	Crushed Stone	1915	7	1,533,177	1/16 in.	1/16 in.
E. 93rd St.	Car House	3,588	95–400	Carnegie	Concrete	1915	7	1,629,666	1/16 in.	1/8 in.
Car House	Corlett	11,515	95–400	Carnegie	Concrete	1915	7	1,594,698	1/16 in.	1/8 in.
CEDAR AVENUE LINE										
E. 22nd St.	E. 36th St.	6,313	95–297	Oak	Earth	1901	21	†2,233,214	1/16 in.	1/8 in.
E. 36th St.	E. 39th St.	2,032	95–319	Oak	Crushed Stone	1906	16	†2,233,214	1/8 in.	1/4 in.
E. 39th St.	E. 55th St.	3,294	103–426	Carnegie	Concrete	1909	13	†2,233,214	1/8 in.	1/16 in.
E. 55th St.	Ashland Rd.	1,346	95–400	Alternate‡	Concrete	1919	3	594,296	1/8 in.	1/16 in.
Ashland Rd.	E. 65th St.	1,026	95–400	Oak	Crushed Stone	1913	9	1,864,329	1/8 in.	1/8 in.
E. 65th St.	E. 70th St.	2,926	95–400	1469 ft. Int'l Ties	Concrete	1919	3	594,296	1/8 in.	1/16 in.
E. Bd. E. 70th St.	E. 105th St.	6,841	95–400	Carnegie	Concrete	1916	6	1,230,206	1/8 in.	1/16 in.
E. Bd. E. 105th St.	Fairmount Blvd.	1,278	95–400	Carnegie	Concrete	1916	6	1,230,206	1/8 in.	1/16 in.
W. Bd. E. 70th St.	E. 84th St.	3,291	95–400	Carnegie	Concrete	1919	3	594,296	1/16 in.	1/16 in.
W. Bd. E. 84th St.	E. 105th St.	3,274	95–400	International	Concrete	1917	5	1,015,371	1/8 in.	1/16 in.
W. Bd. E. 105th St.	Fairmount Blvd.	984	95–400	International	Concrete	1917	5	1,015,371	1/8 in.	1/16 in.
Fairmount Blvd.	Priv. R. of Way	855	95–400	Carnegie	Concrete	1913	9	1,864,329	1/16 in.	1/8 in.
EAST 55TH STREET (CROSS TOWN LINE)										
St. Clair St.	Payne Ave.	5,938	95–400	Carnegie	Concrete	1912	10	2,954,022	N. Bd. 1/8 in.	1/8 in.
Payne Ave	Lexington Ave.	695	95–400	Oak	Crushed Stone	1914	8	4,236,930	S. Bd. 1/16 in.	1/16 in.
Lexington Ave.	Hough Ave.	919	95–400	Carnegie	Concrete	1912	10	3,183,618	1/8 in.	1/16 in.
Hough Ave.	Perkins Ave.	495	95–400	Carnegie	Concrete	1912	10	4,527,488	1/8 in.	1/16 in.
Perkins Ave.	C. & P. R. R.	1,395	95–400	Carnegie	Concrete	1912	10	2,961,931	1/8 in.	1/16 in.
C. & P. R. R.	Euclid Ave.	624	95–400	Oak	Crushed Stone	1913	9	2,683,071	1/8 in.	1/16 in.
Euclid Ave.	Central Ave.	4,406	95–400	Carnegie	Concrete	1913	9	2,683,071	N. Bd. 1/16 in. & 1/8 in. S. Bd. 1/8 in. & 1/16 in.	1/8 in.
Central Ave.	Scovill Ave.	2,649	95–319	Oak	Crushed Stone	1909	13	†2,961,931	1/8 in.	1/8 in.
Scovill Ave.	Woodland Ave.	2,601	95–400	Carnegie	Concrete	1914	8	2,368,443	1/8 in.	1/8 in.
Woodland Ave.	Diamond Ave.	2,817	95–400	Carnegie	Concrete	1913	9	2,638,071	1/8 in.	1/16 in.
Diamond Ave.	Julia Ave.	288	95–400	Oak	Crushed Stone	1917	5	1,464,704	1/16 in.	1/8 in.
Julia Ave.	Viaduct	715	95–400	Oak	Crushed Stone	1913	9	2,707,224	1/8 in.	1/16 in.
On Viaduct		1,150	100 lb. ARA	Bridge		1921	2	255,576	0	0
Viaduct	Erie R. R.	4,153	95–400	Carnegie	Concrete	1913	9	2,707,224	1/8 in.	1/16 in.
Erie R. R.	McBride Ave.	2,410	95–400	Oak	Crushed Stone	1920	2	568,654	1/8 in.	1/16 in.
McBride Ave.	Broadway	2,536	95–400	Carnegie	Concrete	1914	8	2,391,304	1/8 in.	1/8 in.
EUCLID AVENUE LINE										
Ontario St.	E. Roadway	304	95–319	Oak	Crushed Stone	1908	14	†8,958,981	....	1/16 in.
E. Roadway	E. 9th St.	2,639	95–400	Carnegie	Concrete	1913	9	9,354,816	1/8 in.	1/8 in.
E. 9th St.	E. 14th St.	2,352	95–400	Carnegie	Concrete	1914	8	6,862,348	1/16 in.	1/16 in.
E. 14th St.	E. 21st St.	3,435	95–400	Alternate‡	Concrete	1920	2	1,275,604	3/16 in.	1/8 in.
E. 21st St.	E. 40th St.	9,488	95–400	Carnegie	Concrete	1915	7	3,456,607	1/8 in.	1/16 in.
E. 40th St.	E. 55th St.	2,768	95–400	Oak	Crushed Stone	1912	10	5,299,015	1/8 in.	1/16 in.
E. 55th St.	E. 57th St.	697	95–400	Oak	Crushed Stone	1913	9	5,053,706	1/16 in.	1/8 in.
E. 57th St.	E. 105th St.	18,750	95–400	Carnegie	Concrete	1914	8	4,581,042	1/16 in.	1/16 in.
E. 105th St.	Univ. Circle	1,316	95–400	Carnegie	Concrete	1913	9	5,053,706	1/8 in.	1/16 in.
Univ. Circle	W. Pk. Entrance	539	95–400	Oak	Crushed Slag	1920	2	877,043	1/8 in.	1/8 in.
Univ. Circle	W. Pk. Entrance	1,102	100 lb. ARA	Oak	Crushed Slag	1920	2	877,043	1/8 in.	1/8 in.
W. Pk. Entrance	E. 118th St.	5,835	95–400	Alternate‡	Concrete	1919	3	1,259,243	1/16 in.	1/16 in.
E. 118th St.	E. 123rd St.	1,370	95–400	Oak	Crushed Slag	1919	3	1,259,801	E. B. 1/8 in. W. B. 1/16 in.	E. B. 1/8 in. W. B. 1/16 in.
E. 123rd St.	City Line	1,908	95–400	Carnegie	Concrete	1913	9	3,282,010	1/8 in.	1/16 in.
E. Bd. City Line	Superior Ave.	3,325	95–400	Carnegie	Concrete	1917	5	2,003,191	1/8 in.	1/16 in.
E. Bd. Superior	Windermere	2,520	95–400	Alternate‡	Concrete	1917	5	2,003,191	1/8 in.	1/16 in.
W. Bd. City Line	Eddy Rd.	4,512	95–400	Alternate‡	Concrete	1917	5	2,003,191	1/8 in.	1/16 in.
W. Bd. Eddy Rd.	Windermere	1,335	95–400	Alternate‡	Concrete	1918	4	1,618,182	1/16 in.	3/16 in.
Windermere	Hastings Rd.	9,586	95–400	Alternate‡	Concrete	1918	4	846,354	1/16 in.	1/8 in.
Hastings Rd.	Ivanhoe Rd.	4,670	95–400	Alternate‡	Concrete	1919	3	651,429	1/8 in.	1/16 in.
LORAIN AVENUE LINE										
W. 25th St.	Fulton Rd.	4,312	95–400	Carnegie	Concrete	1914	8	1,856,983	E. Bd. 1/8 in. W. Bd. 1/16 in.	E. Bd. 1/8 in. W. Bd. 1/16 in.
Fulton Rd.	N. Y. C. & St. L. R. R.	8,218	95–400	Carnegie	Concrete	1914	8	2,190,529	1/8 in.	1/8 in.
N. Y. C. & St. L. R. R.	W. 73rd St.	4,084	95–400	Carnegie	Concrete	1915	7	1,890,933	1/8 in.	1/8 in.
N. Y. C. & St. L. R. R.	W. 73rd St.	820	95–400	Oak	Crushed Stone	1915	7	1,890,933	1/8 in.	1/8 in.
W. 73rd St.	Car House	9,394	95–400	Carnegie	Concrete	1913	9	2,485,588	1/16 in.	1/8 in.
Car House	Old City Line	1,262	95–400	Oak	Crushed Stone	1920	2	405,862	1/16 in.	1/16 in.
W. Bd. O. City Line	W. 117th St.	4,406	95–400	Carnegie	Concrete	1916	6	815,338	1/16 in.	1/8 in.
E. Bd. O. City Line	W. 117th St.	3,868	95–400	International	Concrete	1917	5	705,034	1/16 in.	1/16 in.
SUPERIOR AVENUE LINE										
E. Roadway	E. 3rd St.	657	95–400	Carnegie	Concrete	1913	9	4,672,862	1/8 in.	1/16 in.
E. 3rd St.	E. 9th St.	1,813	95–400	Carnegie	Concrete	1913	9	4,672,862	1/8 in.	1/16 in.
E. 9th St.	Payne Ave.	569	103–426	Oak	Crushed Stone	1911	11	5,568,666	3/16 in.	1/16 in.
Payne Ave.	E. 12th St.	636	103–426	Carnegie	Concrete	1910	12	†3,941,063	1/4 in.	1/8 in.
E. Bd. E. 12th St.	E. 22nd St.	2,308	103–426	Oak	Crushed Stone	1910	12	†3,941,063	1/4 in.	1/8 in.
W. Bd. E. 12th St.	E. 22nd St.	2,308	103–426	Carnegie	Concrete	1910	12	†3,941,063	1/4 in.	1/8 in.
E. 22nd St.	E. 36th St.	7,249	103–426	Carnegie	Concrete	1910	12	†3,941,063	1/4 in.	1/8 in.
E. 36th St.	E. 55th St.	8,296	103–426	Carnegie	Concrete	1910	12	†3,959,559	1/4 in.	1/8 in.
E. 55th St.	E. 65th St.	3,100	103–426	Carnegie	Concrete	1910	12	†3,954,751	1/4 in.	1/8 in.
E. 65th St.	E. 66th St.	656	103–426	Carnegie	Concrete	1910	12	†3,954,751	1/4 in.	1/8 in.
E. 66th St.	Ansel Rd.	13,256	103–426	Carnegie	Concrete	1910	12	†3,954,751	1/4 in.	1/8 in.
Ansel Rd.	E. 105th St.	3,625	95–400	Carnegie	Concrete	1914	8	3,005,518	1/16 in.	1/8 in.
E. 105th St.	Car Yard	6,180	95–400	Alternate‡	Concrete	1918	4	1,464,070	1/8 in.	1/16 in.
WADE PARK AVENUE LINE										
W. Bd. E. 66th St.	E. 79th St.	2,922	95–400	Alternate‡	Concrete	1918	4	692,969	1/8 in.	1/16 in.
W. Bd. E. 80th St.	E. 86th St.	1,116	95–400	Alternate‡	Concrete	1918	4	692,969	1/8 in.	1/16 in.
E. Bd. E. 66th St.	E. 71st St.	1,352	95–400	Alternate‡	Concrete	1918	4	692,969	1/8 in.	1/16 in.
E. Bd. E. 80th St.	E. 86th St.	1,114	95–400	Alternate‡	Concrete	1918	4	692,969	3/16 in.	1/8 in.
E. Bd. E. 71st St.	E. 80th St.	2,065	95–400	International	Concrete	1919	3	411,238	1/16 in.	1/16 in.
W. Bd. E. 79th St.	E. 80th St.	631	95–400	International	Concrete	1919	3	411,238	1/16 in.	1/16 in.
E. 86th St.	E. 105th St.	3,339	95–400	Alternate‡	Concrete	1919	3	411,238	1/8 in.	1/16 in.
E. 86th St.	E. 105th St.	2,787	95–400	International	Concrete	1919	3	411,238	1/8 in.	1/16 in.
E. 105th St.	E. 118th St.	6,071	95–400	Oak	Crushed Slag	1921	1	179,286	1/8 in.	1/16 in.

* Lorain Steel Company's section unless otherwise specified.
† Record covers years 1911-1921 inclusive.
‡ Alternate Carnegie and International steel ties.
The above record is as of Jan. 1, 1922.

city, tracks which were constructed with a 9-in. tram rail and wooden ties, with dirt foundation, and have had only 16,000,000 car wheels over them, have had to be relaid with modern construction.

It may be questioned whether with the light-weight cars now being used the tracks may be constructed lighter than in previous years. One of the greatest sources of expense in maintaining car tracks, however, is the paving. If the track structure is rigid, the pavement will stay in position. Today the pavement must be constructed to stand the shocks caused by the enormous weights carried on motor trucks and other vehicles. This means that the track structure must be designed to accommodate the improved type of pavement. We also are confronted with the weight of work trains and other special rolling stock that necessarily pass over our tracks. It is, therefore, economy to build a type of construction suitable for any traffic that may be placed upon this track providing a large margin of safety.



Above—Extra Duty of Present-Day Track Is Shown by Increasing Number of Cars per Mile. Below—Average Life of Track Removed Has Been Maintained Despite Added Service

An accompanying illustration shows the end of a Lorain Steel Company section 95-400 rail which was in service eight and one-half years, and which was taken from a portion of the track at a car stop. About 21,000,000 wheels passed over this rail. It finally failed below the head.

It will be noticed that the wear on the rail is not evenly distributed over the head, due to the coning of the car wheels. Tilting of the rail to an angle of 1 in 25 will allow ⅛ in. more wear on the head of the rail, which means at least 15 per cent more life. For this reason, the Cleveland Railway has redesigned this rail section and is now using a new section, known as section 102-516, instead.

Carrying Safety to the Public—X*

Accidents Now Cost Electric Railways a Large Sum—Greatest Reduction Can Come Only by Enlisting the Public—A Continuous Campaign Is Necessary

By C. W. Price
Vice-President in Charge of Public Safety,
Elliott Service Company, New York City.

IN THIS, the last of the series of ten articles, I wish to submit twelve statements, which I believe to be statements of fact which can easily be verified by any railway executive. A careful consideration of these should convince any executive that in his own city or town he should not only give his whole-hearted support to any intelligent effort to organize community safety, but more than this, he should take the initiative in launching such a movement. Judging by the experience thus far the development of public safety in the future, whether it will be slow or rapid, will depend on the initiative and support of the electric railway interests of this country more than on any other one factor.

The whole public safety movement at this particular time is in exactly the same condition as the industrial safety movement was in 1906, and awaits just such an aggressive and constructive leadership on the part of some powerful interest, such as the electric railways, as was given by the United States Steel Corporation to industrial safety in 1907.

Here are the twelve statements:

1. The total cost of accidents to the electric railway systems of the United States each year is approximately $40,000,000. This amount represents some 4.7 per cent of the gross yearly income of the electric railways. Perhaps we can better appreciate the significance of these figures if we will consider that this annual loss to the industry, could it all be prevented, would give a return equivalent to an annual payment of 6 per cent on an investment of $666,000,000.

2. The best figures available reveal the fact that from 50 per cent to 65 per cent of the electric railway accidents are accidents in which automobiles and trucks are involved, and the number of such accidents is growing with the increase of motor vehicles. In 1906 there were 106,928 automobiles in the United States, and there were 374 deaths caused by automobiles. In 1922 there were 12,239,114 automobiles and trucks in the United States, or one motor vehicle to every 8.6 persons. We killed during that year 14,000 men, women and children. Between 1919 and 1922 the number of motor vehicles increased on the average 20 per cent each year and the deaths increased on the average 14 per cent each year.

3. A recent report of the Interstate Commerce Commission points out that steam railroad crossing accidents involving motor vehicles have increased 50 per cent since 1917. An investigation of the accidents at crossings of interurban electric railway lines would doubtless reveal a similar increase of their crossing accidents.

4. A recent analysis of the accident experience of one representative electric railway revealed that from

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*Tenth and last of a series of articles.

65 per cent to 75 per cent of the accidents could not be prevented by any effort on the part of the employees, no matter how loyal they were to the safety idea; if prevented at all they must be prevented by reaching the drivers and pedestrians on the street. It is reasonable to suppose that this finding would apply, with some modifications, to all electric railways.

5. The widespread awakening of interest in the whole problem of traffic safety as reflected by the continuous publicity given in the newspapers to the subject of accidents is most significant, amounting as it does almost to a condition of alarm in many cities. This aroused public interest need only be effectively organized and properly led in order to launch a community-wide campaign for safety which will meet with an immediate response from the public.

6. The present conditions call for immediate action before the accident problem gets beyond control and before aroused public sentiment results in drastic and unreasonable legislation.

7. An investigation on the part of any intelligent railway executive of the experience in the cities mentioned in the previous articles, and others, will convince him beyond a doubt that traffic accidents can be prevented; that the public can be reached with the safety idea. He will be convinced that the methods adopted in these cities have developed beyond the experimental stage and have become clearly defined and established as have methods used in promoting industrial safety.

8. A study of the experience of the cities in which substantial reductions have been made in public accidents reveals the fact that there were five distinct features which were the determining factors in reaching and influencing every man, woman and child in the community. These five factors are:

Safety Week.
Safety instruction in the public and parochial schools.
Continuous poster campaign.
Continuous publicity campaign.
Drivers' school.

All of these features have been fully outlined in the previous articles of this series.

9. It is entirely possible and practicable in a community of any size to conduct at a reasonable expense a safety campaign which includes these five features. Specific instructions in regard to methods for conducting such a campaign, and complete material with which to carry out the program, are now available.

10. Because of their financial interest in community safety it will be found in practically any city or town that the railroads, the trucking companies, the taxicab companies and the larger industries will gladly join hands with the electric railway executives in launching a public safety campaign.

11. An investigation of the experience of electric railways in cities where public safety campaigns have been efficiently conducted will convince any railway executive that any reasonable financial support which he may give to a community effort will yield not only ordinary dividends, but extraordinary dividends on the investment.

12. Railway executives are becoming keenly alive to the fact that accidents in which street cars are involved help to break down public confidence and good will. On the other hand the active participation of railway executives in a great community-wide effort to save human life will just as certainly directly contribute to the building up of an attitude of confidence and good will on the part of the people. This is an asset which progressive railway executives are more and more coming to value.

Summarizing what these ten articles all come to and putting in a nutshell what is the secret of success in reaching the public with the safety idea, these three fundamental principles stand out as of paramount importance in a successful campaign:

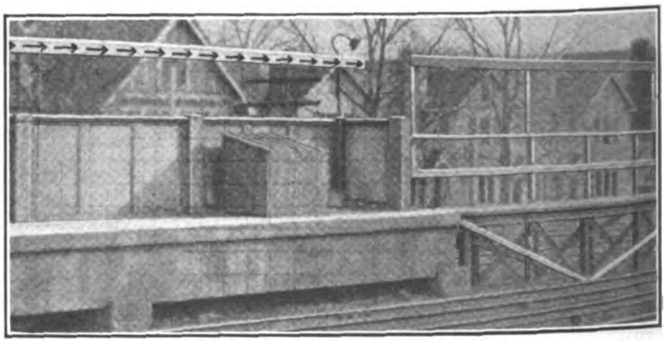
1. An intensive drive at the start off to wake up the community and to demonstrate that accidents can be prevented.

2. Utilization of the already existing agencies in a community, such as the schools, the newspapers, the industries, the police and the clubs, and to have each one function in its own sphere of activity as a big piece of machinery, which when set in motion is capable of reaching continuously day by day and year in and year out thousands of people with the safety message.

3. The visualization of safety through posters and other means so that it is kept continuously and impressively before the people.

Tell-Tale Shows Inaccurate Stops

THE New York Municipal railway operates cars 67 ft. long with three pairs of doors on each side. Many of the trains now being operated are made up in what are termed "three-car units"—that is, the doors for three cars are controlled by a single guard stationed in the center of the middle car. Where these cars run over the elevated structure there are some station platforms which are but little longer than the length of the train. If the motorman stops his train a little too soon or too late, there is danger that one or more of the doors of the end car may project beyond the end of the platform. It is difficult for the guard to know this.



Tell-Tale Boards Give Warning to Guards When Car Doors Should Not Be Opened

In order to provide a warning signal for the guard under the circumstances, the company has installed tell-tale boards at some of the elevated stations. These boards are approximately 91 ft. long and are installed at each end of the platform at a height of about 7½ ft. above the platform level. The end of the board nearest the end of the platform is painted red for the first 23 or 24 ft., and the remainder has red arrows on a white background. If the center door of a single car unit stops in front of the red portion of the tell-tale board, the trainman knows that the end door of that car nearest the end of the platform should not be opened. If a three-car unit is being operated and the center door of the middle car in the unit is opposite any portion of the board marked with red arrows, the operator knows that all of the doors of the first or last car should not be opened.

Chicago's Unified Transit Plan Revived

In a Comprehensive Report to the City Council R. F. Kelker, Jr., Outlines a Plan for a Unification of Surface, Elevated, Subway and Bus Lines—Will Give the City Much Faster Service and Allow It to Develop More Uniformly—Previous Plans Amplified to Meet Present-Day Conditions

THE committee on local transportation of the City Council of the city of Chicago some time ago appointed R. F. Kelker, Jr., its consulting engineer, and directed him to prepare a report on a physical plan for a unified transportation system for the city. The report, which has just been made public, consists of 175 pages of reading matter and numerous charts. The present article covers the general recommendations and a discussion of present conditions. The specific references to new construction will be treated in a subsequent article.

In his report Mr. Kelker states that the plan presented shows a marked similarity to the physical plan recommended in the Parsons-Arnold-Ridgway report of 1916, the general features of which had previously been accepted by the committee as a satisfactory basis for local transportation development. The history of Chicago's transportation development is so well known that it should suffice to call attention to the major improvements only, those of greatest benefit to the public being as follows:

1. Construction of elevated railroad.
2. Rehabilitation of street railways.
3. Unification and through-routing of elevated lines.
4. Unification of street railway lines.

The need for rapid transportation facilities was apparent long before the advent of automobiles and motor trucks, and with the streets practically saturated with vehicular traffic as they are today, this need is now more imperative. Unfortunately for Chicago, rapid transit development has not kept pace with the city's growth in population, and during the last decade, while the population has increased nearly 25 per cent, there has been no increase in rapid transit facilities.

GENERAL PREMISES

The fundamental elements of a plan for an adequate transportation system in a metropolitan city may be stated as follows:

1. Long-haul traffic should be carried on rapid transit lines.
2. Short-haul traffic should be carried on surface lines, serving as feeders to the rapid transit lines.
3. Transfers should be permitted and encouraged between surface and rapid transit lines in order to make rapid transit service accessible to all.
4. Independent transportation systems should be unified and operated as a single system, thereby eliminating competition.
5. The transportation system of the city should be planned for the metropolitan area in advance of traffic demands.
6. Existing structures, as far as possible, should be used to form a part of a complete rapid transit system.
7. The transportation system should connect the various outlying commercial centers of the city in such a manner as to provide rapid transit without passing through the congested central business district.

The engineer points out that the growth and development of our large American cities has been dependent in a great measure upon the facilities afforded by local transport. In fact, it is inconceivable that any modern city, small or large, could have been developed without a system of transportation. Through the development of mechanical traction we now have three distinct types of conveyance for metropolitan city service: Rapid transit trains, street cars and motor buses.

Urban traffic may be classified in two general groups: (a) Short-haul traffic that is largely confined to feeder lines on which single cars are operated, and (b) long-haul traffic that is carried on rapid transit lines on which trains are operated.

The service afforded by these two classes of transit is vastly different. One cannot be effectively substituted for the other, and competition should not exist between them. However, when unusual local conditions interfere with or obstruct the normal function of either system, duplication of service with its consequent waste results.

RAPID TRANSIT LINES

The average ride of the long-haul rider on surface cars in Chicago is now about forty-five minutes. High-speed rapid transit service would reduce this time in many instances to twenty-five minutes or less, a saving of not less than twenty minutes. High speed is conditioned on the frequency of stops and length of standing time at stations, all other matters being equal. The prerequisite conditions for rapid transit development are, first, a traffic of sufficient volume to support the heavy fixed charges; second, a minimum number of stations in order to permit the extended use of crest speed; and third, a minimum length of time for station stops, thus reducing the amount of standing time.

The principal factors other than traffic demands essential to the proper location of rapid transit lines are a right-of-way free from interruption of operation by street traffic, and an alignment suitable for high-speed operation of trains. While it is necessary that only subways be built in congested areas, states the engineer, it is his opinion that a rapid transit system for Chicago should consist largely of elevated railroads supplemented by subways. Nearly 4 miles of the usual type of elevated lines can be constructed for the same cost as 1 mile of subway line; consequently for the same investment an elevated railroad will serve four times the area that a subway will serve. It is desirable to travel above ground, enjoying light and air. With the same equipment and adequate signaling devices equivalent speed may be attained in either case. The casual observer forms an idea of speed of subway trains by the apparent rapidity with which the closely set columns flash by the car windows, which is further accentuated by the roar of the trains.

If a rapid transit system were constructed, exclusively of subways, of the same scope and affording the same facilities as the plan proposed in this report, states the engineer, then the cost of such a transportation improvement would be greater than the cost of the system proposed by $550,000,000. While not affording any better facilities or service nor yielding any increase in gross revenue, this would increase the annual fixed charges of the unified system by more than $27,000,000. This sum is approximately one-third of the present annual gross receipts of the elevated and surface lines combined. To pay the interest and amortize such an investment would, therefore, add nearly 4 cents to the present fare paid by all car riders.

STREET CAR LINES

The elevated and surface lines in Chicago have been operated in competition with each other ever since their construction, which has resulted in duplication of service with its consequent waste and unnecessary expense. By co-ordinating these systems and providing for an interchange of passengers between them, this waste can be eliminated.

Several plans for transit improvement have been suggested in which large expenditures for street car subways have been recommended. These have been largely based upon the improvement of street car service itself and the improvement of street traffic conditions by the removal of street cars from the surface in congested areas. The great cost of subways when used solely by street cars limits their location to the congested areas of metropolitan cities. The cars are subject to all the delays and interruptions incident to operation on the streets for the major portion of their routes. It is impracticable to construct subway stations at each street corner. Therefore, the convenience afforded by the usual car operation would be wholly lacking in subway operation. Moreover, in order to utilize a street car subway up to its capacity, a large number of individual street railway lines must be routed so that they will converge at or near the subway portal and operate through the subway on one or more tracks, which tends to retard rather than to facilitate car movement, as car loading is made difficult.

Subways may be used either for single-car operation or for train operation. If street cars are operated on a single track in single units and on twenty-second intervals, a capacity of 180 cars per hour passing a given point can be obtained. However, if a subway is used for the operation of rapid transit trains, then fifty ten-car trains per hour per track can be operated, or 500 cars per hour.

The engineer holds that street car subways are justified when the primary purpose is to relieve street congestion, regardless of the cost involved. In short, these subways form a street expansion in a vertical direction instead of by the usual lateral method. When street widening is impossible, or impracticable because of the expense, the construction of street car subways may be warranted, although the cost is a burden that should only be carried in a small part by the car riders as such. Removing all street cars from streets in the central district and operating them in subways would entail the use of a large amount of capital, which would require higher fares entirely disproportionate to the slight benefit the car riders would receive in return.

The engineer states that he fully recognizes the necessity of relieving the downtown streets from the obstruction caused by street car operation on the surface. As the recommended plan is developed a material improvement in traffic conditions can be economically secured. This will be accomplished by the extension of the elevated system into all parts of the city, with transfers at the intersecting surface lines. This will place the rapid transit system within easy access of a large proportion of the population, greatly increasing the use of the elevated system by diverting the long-haul riders from the street cars to the elevated lines.

The construction of subways in the territory adjacent to the present Loop district will break down the barriers of that district, thereby expanding it into an area four times its present size. The construction of rapid transit subways for through north and south travel will attract a large number of the car riders who now use the street cars. This and other improvements will cause a shifting of the load which will correspondingly reduce the number of street cars operating through to the Loop, as well as throughout the central business district. The demand for street car service then will be of a local character tending to remain constant. It is estimated that at the end of the first period of construction a satisfactory service could be rendered by 70 per cent or less of the number of street cars now operated in the central business district.

MOTOR BUS LINES

In comparing motor bus lines with street railway lines, the most striking difference is the relatively low initial capital investment for motor bus plant and equipment. The investment for cars and equipment is approximately the same for buses as for street railways, but the latter must have tracks in addition. As the traffic demand increases and additional units are placed in service, the ratio of the track investment to the total investment for street cars is appreciably diminished.

Obsolescence is an important factor in the cost of motor bus operation, and is unfavorable to such service. Buses built only two years ago have been made obsolete by later ones; consequently the cost of displaced equipment is a heavy burden. The power plant and transmission system of a motor bus represents more than 50 per cent of its total value, while the electrical equipment of a street car is about 30 per cent of its total value. The costs of maintenance and depreciation are largely dependent upon these parts of the unit. The gas engine and transmission systems with their many parts are much more costly to renew and maintain than the more simple and rugged street railway electrical equipment and gears. A comparison of the maintenance cost of rubber and steel tires is also unfavorable to the motor bus. Consequently, a point is reached in the density of traffic on a line where the smaller maintenance and renewal cost of the street railway car offsets the advantage of the lower initial investment of the motor bus.

Annual reports for 1922 of the Fifth Avenue Coach Company in New York, and of the Chicago Motor Bus Company in Chicago, show that the cost of operation (maintenance, conducting transportation, etc., including depreciation and taxes) were 8.2 cents and 8.5 cents respectively per passenger carried. On the other hand, according to the annual report of the Chicago Surface Lines for the same year, the above cost of operation was 5.8 cents for each revenue passenger carried. In addition to the items of cost mentioned for motor bus lines the latter figure includes all expenses for the maintenance of paving, cleaning of streets, etc. A comparison of these figures indicates that, at present, motor buses cannot compete economically with street cars on close headway lines where like fares are charged and the length of the average ride remains the same.

RECOMMENDATIONS

After a thorough survey of Chicago's local transportation needs, a careful consideration of the above-discussed principles and a study of the various reports, maps, plans and data, which have been presented to the City Council from time to time, the following recommendations were made by the engineer:

1. Consolidation and co-ordination of all local transportation lines, so as to permit unified operation throughout the city of Chicago.
2. Establishment of a single fare on the unified system within the limits of the city, with transfers between rapid transit and surface lines.
3. Construction of subways and the expansion of existing elevated and surface railways to form a comprehensive and unified system of transportation.

The construction program has been divided into two periods, the first one including such parts of the plan as are urgently required and can be definitely located at this time, while the second includes parts in anticipation of service requirements, changes in the general trend of population and traffic which are likely to occur in the future.

DISCUSSION OF PRESENT CONDITIONS—SURFACE LINES

A description of the present system of transportation in the city of Chicago is next given. The Chicago Surface Lines comprise 1,060 miles of single track and 3,100 cars. This system, which is the combination of a number of subsidiary companies in accordance with the "unification ordinances" of the city of Chicago, is in excellent physical condition, chiefly because of the large expenditures for rehabilitation and extensions made between 1907 and 1911, in which five years about $59,000,000 was expended.

The universal transfer for a single fare on the surface lines and the limited rapid transit development in Chicago have resulted in an average length of ride on the surface lines of 4.2 miles, which is probably longer than that in any other city. The average operating speed of the surface cars between terminals is more than 11 m.p.h., varying from a speed of 5 m.p.h. in the congested areas to a speed of 15 miles in the outlying districts.

Of the total passenger traffic carried by the elevated and surface lines in 1922, the surface lines carried about 80 per cent, or 763,000,000 revenue passengers per annum. In addition to this volume of revenue business there were about 557,000,000 transfer passengers carried.

Under the settlement ordinances of 1907 the city shares in the net receipts of the Chicago Surface Lines to the extent of 55 per cent, as a result of which the city's "traction fund" now amounts to about $27,000,000, in addition to which the companies have offered the city further payments amounting to about $8,000,000. By a further provision of these ordinances 8 per cent of the gross receipts is set aside monthly in a "renewal fund." These accumulations now amount to $14,000,000 according to the reports of the Board of Supervising Engineers, while the combined "capital account" as of Jan. 31, 1923, is $160,975,108.

ELEVATED LINES

The Chicago Elevated Railways operates the rapid transit system of Chicago, which radiates from the central business district. The system comprises 162 miles of track with 1,650 cars and is operated independently of and in competition with the Chicago Surface Lines. The number of revenue passengers carried per annum (1922) is about 181,000,000 or about 20 per cent of the revenue traffic of the two systems.

A free transfer is permitted between the various elevated lines, which is taken advantage of by nearly 50,000 people daily. The average length of ride on the elevated system is about 6.7 miles. The average speed of express trains between terminals is about 20 m.p.h., on portions of the system reaching 25 m.p.h.

The growth of traffic on the elevated system has not kept pace with the increase in population of the city, the principal difficulty in obtaining the maximum capacity being because thirteen tracks converge into the two tracks of the Union Loop. The majority of the people employed in the central business district arrive at their places of employment between 8 and 9 a.m. and leave between 5 and 6 p.m. During intervening hours traffic to and from this district is confined largely to shoppers and visitors, and the total number of people carried in the non-rush hours does not greatly exceed the total volume of the Loop workers who use the elevated in the rush hours.

The value of the physical property and real estate of the Chicago Elevated Railways, according to the Illinois Public Utilities Commission, is $86,250,000 as of June 30, 1919.

BUS LINES

The Chicago Motor Bus Company operates lines on certain boulevards through Lincoln Park and through the northern section of the city, which have been in operation for several years. In April of this year service was extended on the south side, and service on the west side will be initiated in July, according to information furnished by the company. At present ninety-five buses are in operation.

The Depot Motor Bus Company, operating in the central business district, serves several steam railroad stations and carries about 650,000 passengers annually.

The Chicago Elevated Railways has made application to the Illinois Commerce Commission for permission to operate several bus lines as feeders to its system.

PASSENGER STATISTICS

Recent statistics show that the annual revenue passengers carried during the year 1921 by the transportation systems of Chicago were as shown below:

ANNUAL REVENUE PASSENGERS IN THE METROPOLITAN DISTRICT OF CHICAGO

	Revenue Passengers	Per Cent of Total
City Lines		
Surface	750,515,622	71.2
Elevated	180,629,282	17.1
Motor bus	8,428,359	0.8
	939,573,263	89.1
Suburban Lines		
Surface	30,167,803	2.9
High-speed electric	19,575,654	1.8
Steam railroads	65,817,953	6.2
	115,561,410	10.9
Total	1,055,134,673	100.0

The preceding table shows that of all the traffic in the metropolitan area of Chicago more than 88 per cent is dependent upon the surface and elevated lines.

STREET CONGESTION

Conditions in Chicago's congested traffic areas have reached a point where they are deplorable, according to the engineer. The city's streets were not designed for the great volume of traffic of today. Added to this their usable width has been reduced materially since the advent of the automobile, with the resulting parking nuisance. The space available for street cars, which provide a means of transportation for the general public, is becoming more and more limited.

Recent counts of street traffic outbound from the central business district for a period of twelve hours on a normal week day follow:

SUMMARY OF VEHICLE COUNT
OUTBOUND FROM LOOP DISTRICT OF CHICAGO

(6:30 a.m. to 6:30 p.m., normal week day)

Commercial vehicles	Number	Per Cent	Passengers	Per Cent
Horse-drawn	14,500	17.6	14,500	3.3
Motor trucks	17,180	20.9	17,200	3.8
Total	31,680	38.5	31,700	7.1
Passenger automobiles	42,130	51.3	84,300	18.9
	73,810	89.8	116,000	26.0
Surface cars	8,360	10.2	330,000	74.0
Total	82,170	100.0	446,000	100.0

Nearly 75 per cent of the passenger traffic is carried by surface cars, which are only 10 per cent of the total number of vehicles using the streets.

Pedestrian traffic also is assuming such large proportions that it is now becoming a serious factor in its effect on local transportation. A recent traffic count at State and Madison Streets shows that in one hour there were 46,600 pedestrians entering this intersection and at the same time 1,800 vehicles passed through it.

Counts were made during February and March of this year of the number of people leaving prominent buildings between the hours of 12:30 and 6:30 p.m. It was found that there were forty-one buildings from each of which more than four thousand people passed out in these six hours, the total being 532,300 persons. Of that total 291,000 (55 per cent) left eight of these buildings. The following table shows the concentration of pedestrian traffic created by large buildings in three fifteen-minute periods of the evening rush:

PEDESTRIAN COUNT—EVENING RUSH

Type	5:00-5:15 p.m. Number	5:00-5:15 p.m. Per Cent	5:15-5:30 p.m. Number	5:15-5:30 p.m. Per Cent	5:30-5:45 p.m. Number	5:30-5:45 p.m. Per. Cent
Office buildings	21,860	57	11,940	43	11,080	39
Department stores	10,560	28	13,090	48	14,810	52
Public buildings	5,080	13	2,040	7	1,760	7
Hotels	640	2	560	2	590	2
	38,140	100	27,630	100	28,260	100

The movement in the six-hour count was at the average rate of 22,100 for each fifteen-minute period, while the maximum fifteen-minute period shown above is 38,140. The rush-hour congestion is therefore nearly 75 per cent greater than the average.

POPULATION

The population of Chicago has increased from 500 in 1830 to 2,701,000 in 1920. Various forecasts made during the past twenty years estimated a population in 1950 varying all the way from 4,000,000 to 10,000,000 people.

The Chicago Traction and Subway Commission in 1916 estimated that the population of Chicago would be 5,000,000 in the year 1950. This has been adopted by the engineer as a basis for various estimates in this report.

Although the most densely populated districts in Chicago are not as dense as those in other large cities, it is apparent that Chicago has overcrowded housing conditions, caused to a considerable extent by inadequate rapid transit facilities. The following table shows the population area and density of population of various cities:

POPULATION DENSITY IN LARGE CITIES—1920

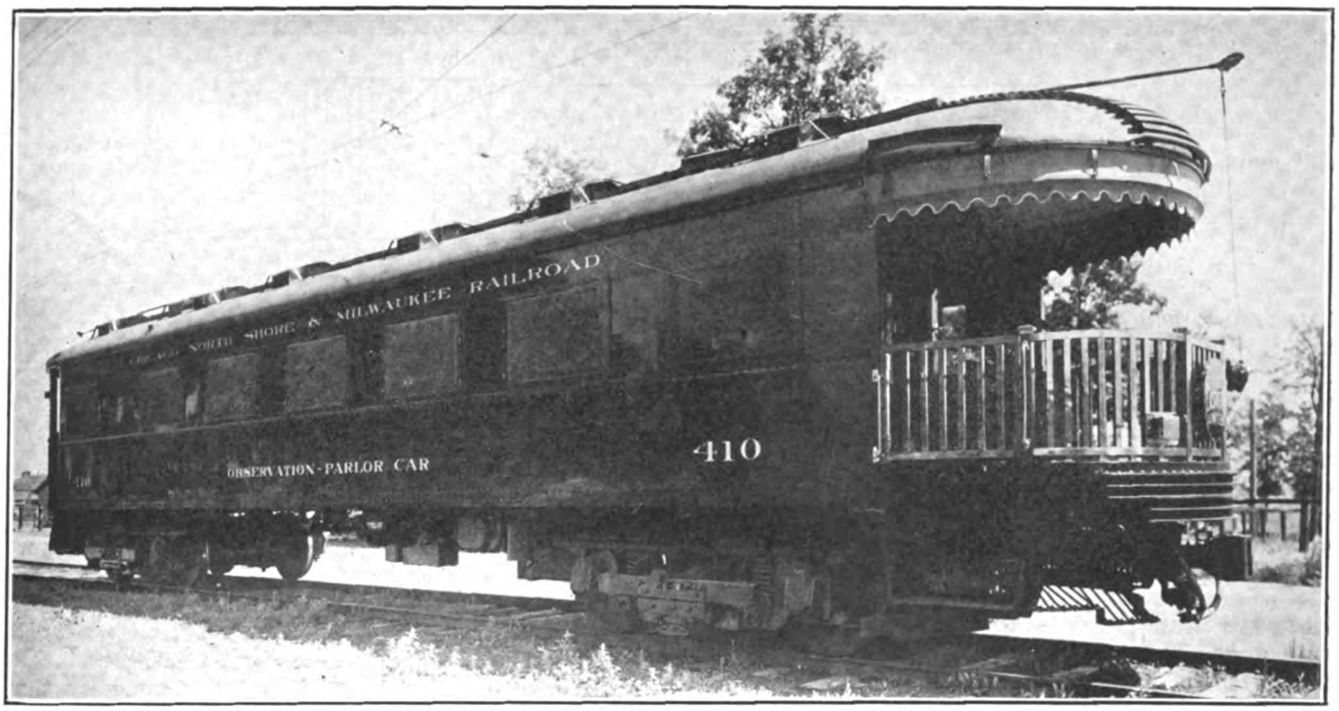
City	Population	Area of City, Square Miles	Population per Acre
New York City (Borough of Manhattan only)	2,284,103	22	162
Paris	2,906,000	30	151
Berlin	2,200,000	29	118
London	4,483,000	115	60
Paris (Metropolitan District)	4,500,000	185	38
New York City	5,621,151	315	28
Boston	748,060	47	25
Cleveland	796,836	57	22
Philadelphia	1,823,158	130	22
Boston (Metropolitan District)	1,772,254	57	21
Chicago	2,701,705	200	21
St. Louis	772,897	62	19
Detroit	993,739	83	19
Berlin (Metropolitan District)	3,804,000	339	18
Chicago (Metropolitan District)	3,000,000	275	17
London (Metropolitan District)	7,476,000	693	17
Baltimore	733,826	92	13
New York (Port Authority)	8,000,000	1,463	9

In the above table the Metropolitan District of Chicago was determined by adding to the municipality all of the principal suburban communities adjacent, within Cook County, and in addition Hammond, Indiana. Only those communities which can be considered a part of the metropolitan district were included.

A study of the figures above discloses that the population density of Chicago strikes a fair average of the density of other large American cities; the extension of the boundaries of Chicago has about kept pace with the growth of the city, and the population density of the Borough of Manhattan, New York, of London and of Paris, in which cities subway development has been extensive, is greater than that of Chicago.

With the growth of the city there has been a distinct change in location of residential districts, the tendency being for these districts to shift outward and away from the central business district. In the past twenty years there has been a great increase in population in the zones lying between 3 and 9 miles from State and Madison Streets, with a corresponding decrease in the zones within the 3-mile radius. The city has grown physically to the north and south, and to a limited extent to the west. The imposition of an additional street car fare at the western city limits doubtless has been a material factor in the limitation of growth in that direction. The natural physical growth eventually should be such as to include all of the territory lying within a 12-mile radius measured from State and Madison Streets.

In order to encourage the future growth of the city provision should be made for its expansion and uniform development by the construction of transportation facilities somewhat in advance of the immediate need therefor. If the construction of these facilities is long delayed the growth of the city will be throttled. The additional facilities recommended in this report will tend to distribute the population more evenly throughout the area of the city.



New Observation Car Which Inaugurates Parlor Car Service Between Chicago and Milwaukee

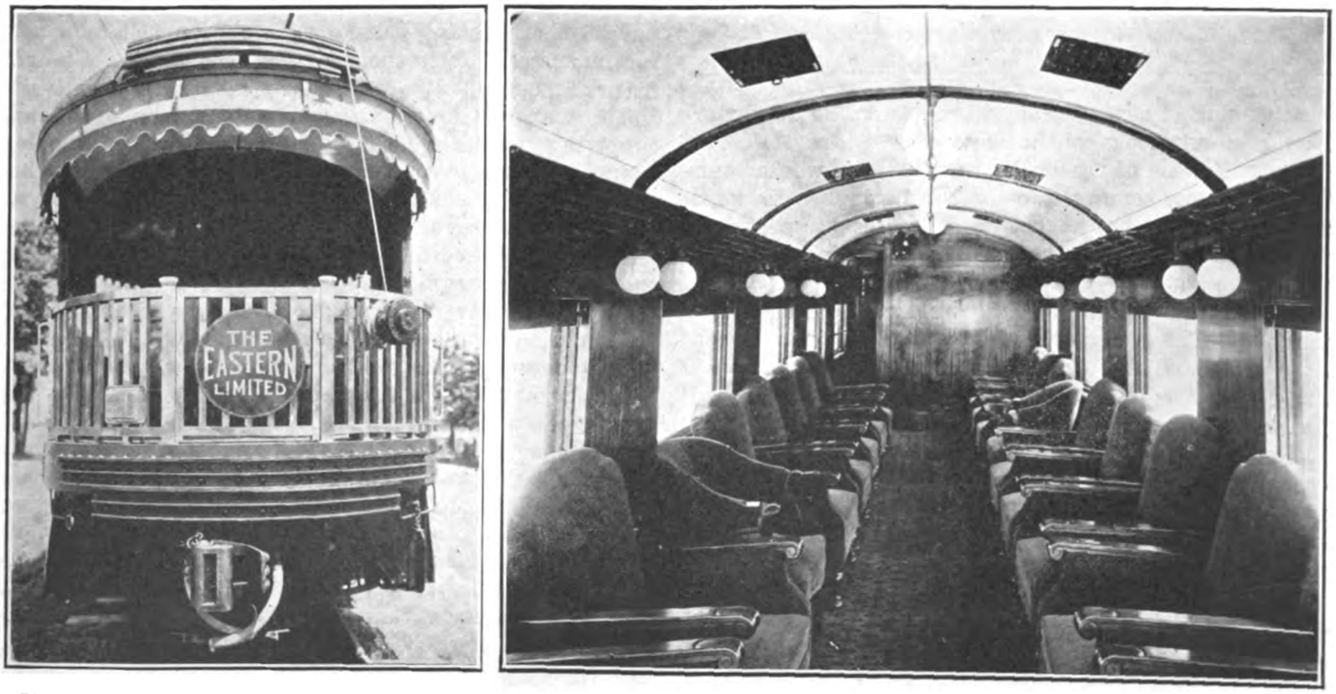
A Car that Makes You Want to Ride

North Shore Line Installs New Design of Parlor Car for Crack Train Connecting with Twentieth Century Limited—Attractiveness and Comfort Are Main Features

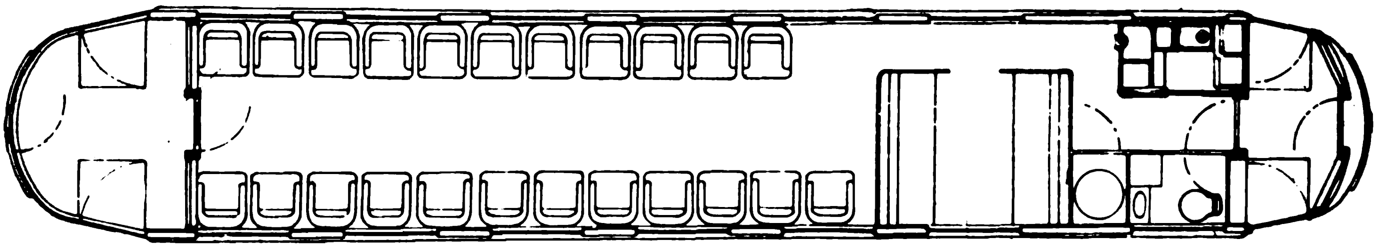
THE inauguration of a new observation parlor car service between Milwaukee and Chicago, on the Chicago, North Shore & Milwaukee Railroad, was made with a trial run of a magnificent new car on Wednesday, July 11. A two-car train, made up of a new diner-motor car and the new trail parlor car, carried officials of the company and guests on a run to Milwaukee. Luncheon was served in the dining car, and a fast return trip to Chicago was followed by several trips around the Loop during the evening rush hour—some very effective advertising, incidentally.

This diner and observation car are the first of several new North Shore cars to be delivered by the Cincinnati Car Company. The new diner will be described in a later article. The observation car is of the characteristic North Shore heavy traction design, and is without motors, though equipped with trolley poles. It embodies in the body structure and arrangements much the same design as is used in steam railway observation cars, and as related in detail in ELECTRIC RAILWAY JOURNAL for Sept. 23, 1922, page 470.

The outstanding feature of the car is its inviting



The Observation Platform from Without and the Comfort and Attractiveness of the Interior Should Certainly Attract Passengers



Seating Arrangement North Shore Line Parlor Car

appearance, both inside and out. The main compartment is provided with olive-green plush over-stuffed lounging chairs and green carpet. The interior finish is of mahogany, and the arched roof ceiling is paneled in an artistic manner. Wall fixtures have been provided in addition to the ceiling lights, giving generous illumination. There is a smoking compartment seating six, and a kitchenette from which beverages and sandwiches may be served.

A new plan of heating has been worked out in connection with these cars. They are equipped with the usual hot-water heater, but of small capacity, and in addition, with thermostatically controlled electric heaters. With this combination it is thought that it will be possible to provide just the right amount of heat under any weather conditions, there having been some difficulty previously in keeping the cars from getting uncomfortably warm on mild days, where a hot-water heater of sufficient capacity for the coldest days was the only heating plant. The plan of operation now will be to use the electric heat alone in mild weather, the hot-water heater alone in normal cold weather, with the electric heat coming in automatically to reinforce the hot-water heater in extremely cold weather.

DETAILS OF NEW NORTH SHORE OBSERVATION CAR

Length over all	55 ft. 3¾ in.	Weight	84,000 lb.
Length over body	44 ft. 2⅛ in.	Seating capacity	31
Length of platform	5 ft. 6⅝ in.	Truck centers	32 ft. 8 in.
Length of observation platform	7 ft.	Wheel base	7 ft.
Extreme width	9 ft.	Wheel diameters	36 in.
Rail to top of trolley boards	12 ft. 7⅞ in.	Post centers	35 in.
Rail to bottom of side sills	3 ft. $4\frac{3}{16}$ in.	Type of roof	Arched
Rail to first step	$16\frac{3}{16}$ in.	Interior finish	Mahogany
Width over side sheathing	8 ft. 8 in.	Type of heater	Hot water
Vestibule door opening	29 in.	Type of ventilators	Garland-C-1
Train door opening	26 in.	Type of operation	Train
Bulkhead door opening	26 in.	Sash	Brass

A new system of ventilation has also been worked out. The fresh air, coming into the car through a forward intake, passes over the hot-water heater pipes and is then distributed into the car body. It is exhausted through eight ventilators spaced along the roof.

In exterior appearance the car is also decidedly attractive. The observation platform is provided with an awning and the usual folding chairs. All windows are copper screened, and these screens will be replaced in winter with storm sash having individual ventilators.

The accompanying photographs give an idea of the construction and appointments of the observation car, for which the general dimensions and equipment are given in the table above. The new cars of this type will be used in the de luxe train service between Milwaukee and Chicago, forming a part of the regular equipment of the Eastern Limited, which makes connection with the Twentieth Century Limited of the New York Central Lines. A small additional charge will be made for seats in the parlor car.

Regulation of Anthracite Industry Is Recommended

Report of the United States Coal Commission Considers Punitive Legislation Undesirable, but Says that the Time Has Come to Establish Public Control

THE outstanding conclusion in the recent report of the United States Coal Commission on the anthracite situation is that the coal industry should come under public regulation. It is pointed out that coal is quite as much a public necessity as gas, street railway service, or any other service or commodity that has been brought under public regulation. The commission believes that there should be no secrets from the public in regard to mining costs, profits, salaries, wages or corporate relations. Banks and insurance companies are privately managed because it has been found by experience that they can be managed more efficiently and economically on the principle of individual responsibility. But, like railroads, they are required to report to a public authority, and they are subject to such regulation in the public interest as experience may show to be necessary and public opinion may from time to time approve. The guiding principle in such enterprises is no longer maximum profit to the owners but maximum service to the public.

The commission does not recommend the abolition of existing property rights, however much may be said for the view that mineral deposits should have been held from the beginning as national rather than individual property. Government ownership, either by purchase at present value or by expropriation is not recommended. It is thought, however, that a limited natural monopoly like anthracite, held by a relatively small number of individuals, estates and companies, and supplying a necessity of life for millions of people, cannot continue to be treated as if it did not affect the public interest. The time has come, the report says, to establish government regulation, but the commission is not yet prepared to recommend the way in which this can best be accomplished.

An analysis is made to show where the anthracite consumer's dollar goes. In this connection it is interesting to note the distribution of a dollar paid in New York for hard coal. According to the commission 56 cents goes to the mine, 18 cents to the railroad, and 26 cents to local dealers. The commission does not undertake to criticise these amounts, but does say that the subject of freight rates for anthracite is worthy of careful study, and in regard to the local dealer, it mentions the undesirable condition that the source of the coal has more to do with the success of the dealer than the efficiency with which he conducts his business.

The report urges Congress to fix a unified standard of weight for anthracite and bituminous coal throughout the country. At present anthracite is mined, sold at the mine, and transported by the gross ton of 2,240 lb., but is retailed in some places by that unit and in some places by the short ton. A reduction in the number of commercial sizes of anthracite is also recommended. Attention is called to the fact that in one instance only, during the war years 1916-1918. has a shortage of anthracite resulted from any other cause than a strike or suspensions at the mines.

Careful sociological studies have been made of the composition of the mining population, living costs and wage rates. In these respects, however, the report is more a presentation of definite facts than a recommendation of policies to be followed. Mention is made, however, of the comparatively large proportion of miners of foreign birth who have made no efforts to become American citizens. It is felt that the companies have been remiss in Americanization work.

Concerning excessive hours of labor, the commission says that in the face of the principle of the eight-hour day, properly accepted in successive agreements since 1916, there can be no justification for the employment of a considerable number of men on shifts of twelve hours or more. Speaking of living conditions, the report says that the impression which a fairminded and sympathetic observer in the anthracite region will gain is of drab and bleak exterior conditions, imposed not by lack of earnings or income but by the very character of the industry. The earnings of full time workers certainly permit the essentials of a reasonable standard of living. Those who take advantage of their opportunity to earn in the various occupations connected with the industry and are not handicapped by serious misfortune need not suffer for shelter, food, clothing or other decencies and comforts of life, even without supplementary earnings of wife or children. On the other hand, many of the families of the miners' helpers or laborers have a very uncertain and inadequate income. Some adjustment of wages and of the terms of employment which will bring larger and more assured income to these laborers is desirable.

Until the total earnings can be compared with the total investment, the public should withhold judgment as to the profits received by the anthracite industry. Judged by this standard the commission says it may be that the margin obtained before the war was too small. If, on the other hand, the pre-war margin was adequate, the present margin may be unduly large, unless in the meantime there has been a marked increase in the investment. The task has proved so involved and far-reaching that the findings of the commission on the subject of the profits of anthracite companies are reserved for a later report. Praise is given to the companies, however, for the way they held down the price during the coal shortage of last winter.

At the end of its report the commission makes this important recommendation:

"The expiration of the contract in the anthracite region should not coincide with the expiration of that in the bituminous region. The contract should run for a definite period of time with the proviso that it shall be deemed to be renewed for a like period of time except as to such provisions thereof in which notice of a desired change shall have been given by either party to the other at least ninety days before the renewal date. Upon these proposed changes the parties shall immediately confer and if, sixty days before the date fixed for the renewal of the contract, they have been unable to agree, they shall report such fact to the President of the United States, specifying clearly the controverted point. The President shall thereupon appoint a person or persons to inquire into and make public the report upon all the relevant facts in the controversy before the date of such renewal shall have arrived."

The commission calls attention to the fact that some of the material presented to it by the operators and by the United Mine Workers is likely, if not actually intended, to inflame the public mind for or against one of the parties. This is the case to an even greater extent in the bituminous controversy. The charges and countercharges are most unfortunate at this period of negotiations. Instead of preparing the public mind as to what will be real justice to the operator and to the miner and what will stabilize the industry, there has been too much of epithet and too little of argument. The commission recommends that each side forget past differences and grievances and attack the problem in a spirit of justice and fair dealing, not only between themselves but with due regard for the rights and sensibilities of the American people.

Selling Transportation in 1890

Some Modern Ideas, Such as the Monthly Ticket, Advocated—Other Methods Used for Building Business—Retrospection Over Thirty Years Reveals Interesting Experience

SO MANY methods of merchandising transportation have been proposed in the last few years that it would seem this is an entirely new idea. It may be interesting to recall a few thoughts presented some thirty-three years ago by Benjamin F. Owen, one-time president of the Reading City Passenger Railway Company, in a paper read before the American Street Railway Association at the 1890 convention and published in the STREET RAILWAY JOURNAL, Vol. 6, page 526. Mr. Owen stated that in 1877 he was made an officer in a street railway about 2 miles long in a city of 40,000 population. The fare was 7 cents. The road had the usual flattering beginning, but latterly had met its deficit by a sale of horses—the trips were reduced until there were only three cars on the road. Since no more horses could be sold, some other means to increase the revenue must be found, or the road would go under.

He soon found that the theory of railroading, so far as the general public is concerned, is, very simply, this:

Adopt a time table with cars as frequent as possible —slightly more than the travel warrants—announce the time of running and run then—a single failure to do so will be quoted against the company for weeks. The next thing was consideration of the fare. The odd amount was not pleasing to the public—it broke a 10-cent piece. The remainder might as well go with it. Five cents, with 3 cents for children, was adopted and tickets sold at six for 25 cents. The writer said that although this change had an immediate effect, the cars still ran empty, passengers looked lonely, felt lonely, and seemed almost guilty when stared at by their neighbors on the sidewalk.

A canvass of the patrons of the road showed but two persons spending as much as $15 a year in carfare. A ticket, giving the one person named thereon the unlimited right to ride for one year, was offered at $12. A few were sold. The price was reduced to $10, with a greater sale. Holders were urged to use the cars frequently to give an appearance of business. The number increased and the price was raised to $15, then to

$25, and finally abolished to make a market for a life ticket.

The annual tickets met the wants of one class. The workingmen required something with less investment, and there was issued about the same time a monthly ticket, giving the one person named thereon unlimited rides for a month at $1. Within a year the sale reached an inconvenient number, and the price was raised to $1.25—then to $1.50. Their sale was still too great, but, as the ticket was useful to workingmen, it was limited to certain hours and on working days only, and finally the rides were limited, the ticket standing at the time of writing the paper (October, 1890) four rides for each working day in the month—good until 8 a.m., 11 to 12 and 4 to 7 p.m.—not good on Sundays or holidays. It made a ride cost 1½ cents. Passengers could not be carried at that price, according to the writer, but it taught people to ride, it made it possible for workingmen and others to live at long distances from the center, it encouraged building on the outskirts and it made outlying property more valuable. The workingman, taught to ride to his work, used the cars freely on Sundays and holidays, taking wife and children with him. His companions without monthly tickets followed his example and paid 5 cents. The wives soon used the cars to markets and stores, with occasional trips to the cemetery or park.

The article states that 5 cents is an ideal fare, but that in the compact city, short distance travel was very limited. To increase it, reduced rate coupon tickets with thirty rides were offered for $1 each. These tickets steadily gained favor until fully 30 per cent of the gross proceeds of the company came from their sale. The tickets were purchased because they were cheap and used by the riders because they held them.

THE SALE OF SECURITIES WAS MADE EASIER WITH A LIFE TICKET AS BONUS

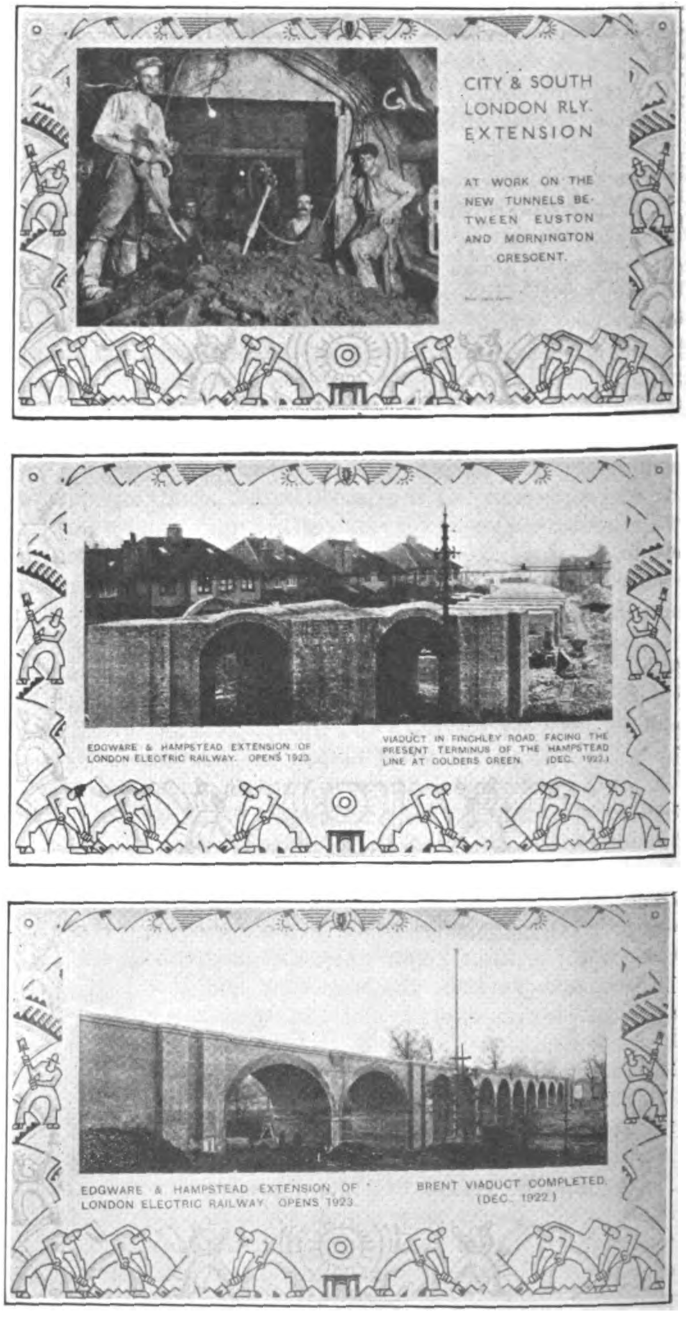
Certain changes in the city made it necessary to abandon a portion of the track, and it was found desirable to build another section to replace it. At the same time the steam railroad built a new station in the heart of the city. The company found it practically impossible, with stock below par and the road mortgaged to build a stable, to sell more stock. It was decided that, as property on the new line would be enhanced in value by the change, property owners should bear the expense of it. A life ticket was offered to each who contributed $300 toward the purpose, the company agreeing to build if the amount were raised. The receipt for the money made the ticket transferable but not redeemable for the first five years and redeemable but not transferable after that date—the ticket to carry one person named on its face. The money was raised and the extension made. The new branch added to the receipts more than was lost from the depot travel, and the holders of the tickets were more than pleased with their bargain. Their property at once found ready sale at lot prices and the tickets afterward changed hands at $400.

The writer states that the success in this venture proved two things—that if fairly approached property holders would pay for extensions, and that extensions were necessary to make the older portions of the road profitable. After all of these various experiments, the writer states further:

"Expedients to build up travel are sometimes necessary, but the prudent manager will so guard matters as to be able in the end to reach that ideal. Life and annual tickets, coupon tickets and monthly tickets may be good, but regard them only as temporary expedients, to be abandoned when travel is established. Keep the cars clean—have the drivers and conductors attentive and polite, allow no disputes with unreasonable passengers.

All others on the car take sides against the railway company. Keep the public with you by keeping them interested. Have every new move given to the papers. People are curious in small places, and will go out of their way even to see the digging of a cellar. If a plot of ground be open for sale at the end of your line, have your stockholders talk it up, remembering that a new house is worth to you from $25 to $50 per year in carfare."

Making Progress Reports to the Public


CITY & SOUTH LONDON RLY. EXTENSION
AT WORK ON THE NEW TUNNELS BETWEEN EUSTON AND MORNINGTON CRESCENT.
EDGWARE & HAMPSTEAD EXTENSION OF LONDON ELECTRIC RAILWAY. OPENS 1923.
VIADUCT IN FINCHLEY ROAD FACING THE PRESENT TERMINUS OF THE HAMPSTEAD LINE AT GOLDERS GREEN. (DEC. 1922.)
EDGWARE & HAMPSTEAD EXTENSION OF LONDON ELECTRIC RAILWAY. OPENS 1923.
BRENT VIADUCT COMPLETED. (DEC. 1922.)

THE London Electric Railway is building an important extension of a rapid transit line and is publishing a series of posters, like the three reproduced herewith, to keep the public informed of the progress of this extensive construction work.

Present Conditions in Norfolk, Richmond and Petersburg

Jitneys Are Troublesome in the First Two Cities—Railless Car Gaining in Popularity, Though Its Use Is Still Limited—Observations of "Journal" Editor on Three Divisions of the Virginia Railway & Power Company

By "Spectator"

WHEN I visited Norfolk early last month I found the jitney problem a serious one for the Virginia Railway & Power Company. The jitneys were probably taking in $2,000 per day. They were thick on the main car-line streets. Many buses were operated, and the larger part of the jitneys were regular buses. The jitneys were being given permits by the city to operate continuously over fixed routes, but obviously it was difficult to supervise operation of these vehicles. The fare charged by the jitneys was 7 cents, the railway fare being 7 cents, or four tickets for a quarter. The car fare was raised from 6 cents, with tickets at the same rate, on June 10, 1923. The hope of the railway management is that the jitneys will be classed as common carriers and brought within the jurisdiction of the state commission. This commission has jurisdiction now over them outside the cities. The principle is, therefore, established that these vehicles are common carriers outside the cities and it is difficult to see how the present system of control can be permanently continued, the railways in the cities having within recent years been taken by act of legislature into the jurisdiction of the state. The public service law of Virginia, it will be remembered, originally comprehended only the steam roads, but provided for extension of jurisdiction to public utilities by legislative action. Such action was taken in 1920, the law having been enacted in 1914.

The recent increase in fare was allowed as necessary with the lowest valuation which had been suggested for the property. The city has recently been making a valuation, and while the result is a value much below that considered equitable by the company, the latter believes that the city appraisal was made in a spirit of entire fairness. Differences lie largely in items on which it is generally difficult for owners and municipalities to agree. The company had a complete appraisal made some years ago by Stone & Webster, which covered the property in great detail. The city considers the value set thus to be much too high. There is this to be said regarding the local situation: Norfolk is governed by a commission of five members elected at large, with details administered by a city manager. There is, therefore, a better opportunity than in many places for an understanding to be reached between the public and the company regarding principles to be followed. The jitney competition is the stumbling block now. The city government goes on the principle that the jitneys furnish necessary transportation and allows practically unlimited competition. With this handicap the company not only loses business directly, but the beneficial effects of increases in fare allowed by the state commission are neutralized by the deflection of patrons to the city-allowed competitors.

A. Merritt Taylor, two years ago, presented a report for the city commission on transportation conditions in Norfolk. His recommendations, if followed, would have improved matters considerably. They have not been followed, at least to any great extent, and the city is therefore losing the benefit of the advice of its own expert. It is possible that the city lacks machinery to put the Taylor recommendations into operation, as it is a large city for the city manager plan, under which it is operated. In the meantime it is fortunate for the railway company that it is also in the light and power business. Enough said.

It was interesting to ride on the free trolley bus, or railless car, as it is called locally, which is, or was, being operated on a loop in the center of town to demonstrate the practicability of this form of vehicle. The bus was furnished by the Brill company and operated by the railway company at the request of the City Council. The Virginia Railway & Power Company is an advocate of the use of this vehicle and would use it for certain services if permission to do so could be obtained. It is doing so in a preliminary way in Petersburg, near Richmond, the only city which has placed no restrictions in its way. In Norfolk the public authorities look favorably on it, and one official went so far as to say to me that it will prove the salvation of the electric railway.

The safety cars are operating in large numbers in Norfolk and nearby Portsmouth, with eminent satisfaction to the public. At one time they were barred from the city due to illy judged agitation. These, like the larger cars, are gradually blossoming out in bright orange enamel in place of the dull green formerly in vogue. While they may thus be more difficult to keep clean they will be better salesmen of the service.

In Norfolk I looked in on the Norfolk Southern, a steam railroad which has a two-route, or rather loop, electric line to Virginia Beach and Cape Henry. This railroad is a joint owner in the fine union station, which while primarily a steam terminal also serves the electrified line.

The Virginia Beach-Cape Henry line formerly carried mainly summer traffic, but the quality of the service furnished is building up all-year business as permanent residents are settling along the line. While the Norfolk Southern track, steam and electric, is practically unballasted, it is substantially constructed and Norfolk & Western excursion trains are handled to Virginia Beach by means of Norfolk Southern electric locomotives.

An interesting feature of the Norfolk Southern shops, which are not extensive as the number of cars to be maintained is small, is that they are housed in ready-made (Truscon) steel buildings. At a cost of about $450 per car, sixteen sixteen-bench open cars have recently been converted in these shops into closed cars of very creditable construction and appearance.

Going from Norfolk to Richmond, where the railway also is part of the Virginia Railway & Power Company property, I found the property there, as at Norfolk, Portsmouth and Petersburg, pervaded by the personality of the president, T. S. Wheelwright. Mr. Wheelwright is not a railroad man by training, but from boyhood has shown remarkable executive talent. He is proud of the fact that when a young court stenographer he took dictation (stenographically speaking) from Frank J. Sprague, who was doing pioneer work in replacing the horse (or mule) with electric motive power on the railway in Richmond.

MR. WHEELWRIGHT BELIEVES IN PUBLICITY

Mr. Wheelwright had numerous difficult but ultimately successful business experiences away from Richmond, including the development of the telautograph, but threw up an excellent job to go back to "Old Virginny," without any idea what he was going to do there. It was not long before he had a proposition from Frank J. Gould to manage the Old Dominion Iron & Steel Company in Richmond. Mr. Gould had just acquired this property and wanted a president for it. Through a mutual friend he heard of Mr. Wheelwright and thrust the job on the latter, who knew steel only from the chemical side. Then when Mr. Gould took over the Virginia Railway & Power Company he insisted that its presidency be added to that of the steel company. Mr. Wheelwright, in taking on this latest job in a new field, made a specification that not a cent of expenditure should be made by the company that the public could not be told about. This suited the new owner "to a t." The rule has been followed and the public is coming gradually to respect the policy and bit by bit the situation is improving.

In Richmond I found a peculiar jitney situation, which bids fair, however, to work itself out shortly on economic grounds. In seriousness it does not compare with that in Norfolk. On Franklin and Grand Streets, good residence and business streets where there are no car tracks, a merry warfare is going on between a flock of Fords and other jitneys of the original type, charging mostly a 5-cent fare, and an independent line of excellent buses with good financial backing. The bus promoters expected to kill off the jitneys, even at the fare of 8 cents which they charge, but so far they have been disappointed. It is difficult to figure out how either can succeed in direct competition with nearby parallel rail lines giving excellent service. Except for the effect on the railway revenues, the situation is amusing and the appearance of the ubiquitous little jitneys is especially so. The enactment of the state law mentioned in connection with my visit to Norfolk would clarify the situation.

Richmond is struggling along under a 6-cent fare. It needs more, but is expecting that good service rather than agitation will bring relief. John A. Beeler's organization recently reported on the local situation for the City Council. Mr. Beeler made a number of detailed recommendations, but the city has apparently done nothing with the report as yet, and has given no indication of what it plans to do. In the meanwhile the president insists that the company demonstrate the fact that there are two essentials of utility success—character and credit, especially the former, which applied to electric railway service means quality. This explains his interest in the railless car, which his associates share. If the use of this vehicle were permitted in Richmond it would undoubtedly be applied in certain sections there.

Meanwhile in Portsmouth, where Mr. Wheelwright's company operates the railway, an extension of a line leading to an important city park has been equipped for railless operation. I found two handsome cars in the carhouse awaiting completion of the roadway upon which they are to run. They will serve a newly developed residence section. If the service proves satisfactory, it will be extended, some track in paved streets being removed in connection with the extension.

An unusual incident which occurred recently in Portsmouth was the petitioning of the management by the employees to permit the naming of a new power plant and substation in honor of J. E. Harvell, general manager of the Richmond and Petersburg divisions. The desired permission was granted and a bronze tablet has been placed on the wall of the "Harvell Power Station" commemorating the fact that Mr. Harvell, who still lives in Petersburg, was employed on its site thirty-two years ago. The station has been his special pride and, while not a large plant as modern stations go, it is a jewel in design and construction.

The Readers' Forum

Further Information on the Timber Situation

PUBLIC SERVICE RAILWAY

NEWARK, N. J., July 6, 1923.

To the Editors:

In the issue of the ELECTRIC RAILWAY JOURNAL for May 12 you published a letter from me dealing with the importance and economic necessity for wood preservation and conservation of our national forest resources. You followed this with an editorial along the same lines in the issue of June 2.

Since these latest two comments on this extremely important subject appeared, the United States Department of Agriculture has issued Bulletin No. 1119, dated April 25, 1923, on "Lumber Cut of the United States from 1870-1920." It was prepared by R. V. Reynolds, forest examiner, and Albert H. Pierson, statistician in forest products, United States Forest Service. This bulletin contains sixty-two pages of data and statistics compiled from reports and records of the Forest Service and the Bureau of the Census. It should be read and studied carefully by every consumer of timber in this country, for the facts are so clearly stated as to make their interpretation easy to the non-technical man as well as the engineer.

It is, of course, not possible to make a general review of its contents in a communication of this kind, but there are a few outstanding features which substantiate the statements made in my previous communication to such a degree as to justify my calling specific attention to them. The American Electric Railway Engineering Association committee on wood preservation is attempting to make the electric railway industry realize the seriousness of the situation and do its part. The investigations we have made to date show that the industry does not realize this. We want to make railway men understand the condition the industry is approaching. If we succeed in this, half the battle has been won. Through the association we have placed in their hands specifications for wood preservative treatments, and wood preservative oils, the instruments for prolonging the life of their timber, but unless we can impress them sufficiently with the economic necessity for making use of these processes and materials, we have accomplished nothing and our efforts have been largely wasted.

Referring to the bulletin in question, the data show that there has been an average annual decline of 2 per cent in the production of all classes of lumber in the thirteen years since the peak, which occurred in 1907. While the decline has not been continuous, its trend is unmistakable and its magnitude notable. This decline has a more serious meaning when it is compared with an increase of 15 per cent in the population of the United States during the last decade. For such an increase in population, an increase in lumber production would normally have been expected. While part of the decrease in lumber production may be due to an increasing use of brick, concrete and other fireproof materials in building construction, the steadily increasing cost of lumber has certainly been largely responsible.

As the authors have stated: "As the supply decreases, rising prices tend to restrict this use. . . . The average American is using about the same amount of lumber as he did in 1866, fully one-sixth less than in 1890, and 40 per cent less than in 1896. In 1920 for his reduced yearly quota he paid in dollars three times as much as he did in 1890. . . . Even measuring the cost in terms of other commodities, he paid the manufacturer in 1920 more than he did thirty years before for a supply which was nearly one-sixth larger."

The records show that four-fifths of the original Southern pine is gone, and there is in progress a marked drift of lumbermen from the Southern states to the Pacific Coast and to the northern part of the Rocky Mountains. A table in the bulletin shows that lumber production has passed its maximum in all regions except on the Pacific Coast and in the Rocky Mountains. The production curves for these regions are ascending, while those for the Southern states are falling rapidly, and for the first time the production of the Pacific and Rocky Mountain groups exceeds that of the Southern pine group, and the indications are that we must look more and more to the West as the main center of supply. Douglas fir has invaded the Central and Eastern lumber markets to a rapidly increasing degree, until now it is appearing as a prominent factor on the Atlantic Coast, this market being made more accessible by reason of the operation of the Panama Canal.

According to the authors' data, "Not quite 50 per cent of the lumber produced in the United States is consumed north of Tennessee and east of Iowa. Heretofore the average haul of timber to this region has been between 500 and 1,000 miles. Hereafter, a large amount of the supply will have to be hauled between 2,000 and 3,000 miles, although a considerable amount may find its way through the Panama Canal. In the years when much more timber was accessible to waterborne traffic, transportation cost from $1 to $3 per thousand feet. In the year of this report it cost about $9 per thousand from the South and about $20 from the Pacific Coast to New York, the steamer rate from the West Coast to New York in March, 1922, being approximately $18.25 per thousand feet."

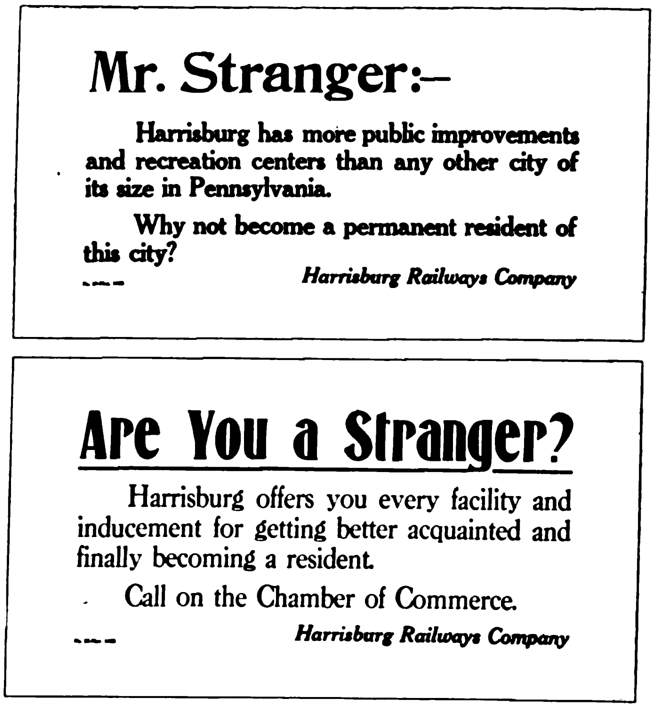
There seems to be an opinion among many that our lumber resources are inexhaustible, hence as long as there is plenty for the immediate future why worry about the more or less distant future. But it is a fact that we are cutting in earnest our last reserve of virgin timber and no suitable cycles of new forest have been provided. The result will be that, while we will always have lumber in our markets, the price is going to soar to the point where the average user cannot afford to pay it, and the resulting increased cost will be reflected back, either directly or indirectly, into shelter, food; clothing, fuel, transportation, etc.

The whole problem resolves itself into two considerations. The first, how to postpone the evil day as long as possible, is answered in one way, namely, the use of the most efficient preservative treatment of all timber that can be afforded. The second, that of providing against the day when the present virgin forests have been stripped, is answered by forest culture on an extensive scale.

The absolute necessity for both steps must be recognized. Timber will have to be considered as a national crop the same as our corn and wheat, and, while it will probably never be as plentiful in the future as it has been in the past, there should eventually be sufficient to meet all our annual requirements if such a program is carried out.

HOWARD H. GEORGE,
Engineer Maintenance of Way.

Local Railway Boosts Harrisburg



Mr. Stranger:—

Harrisburg has more public improvements and recreation centers than any other city of its size in Pennsylvania.

Why not become a permanent resident of this city?

Harrisburg Railways Company

Are You a Stranger?

Harrisburg offers you every facility and inducement for getting better acquainted and finally becoming a resident.

Call on the Chamber of Commerce.

Harrisburg Railways Company

Car Cards Used to Stimulate Interest in Locality as Permanent Residence

THE Harrisburg Railways has recently used car cards to direct attention to the advantages of permanent residence in the city. The local Chamber of Commerce reports that they have been successful in stimulating inquiries, which have come to the office by mail, telephone and personal calls.

Association News & Discussions

Selecting a Railway Motor for a Given Cycle of Duty*

By W. G. Gordon

Traction Engineer, Canadian General Electric Company, Toronto

In deciding on the proper railway motor to adopt for definite street railway service, consideration has to be given to certain variable characteristics which are not met with in any other class of commercially adopted electric drive. The American Institute of Electrical Engineers in its standardization rules defines the nominal rating as the output of the motor on a stand test for one hour under specified conditions.

In the test run for determining the nominal rating only a small proportion of the heat escapes, most of it being used in heating the mass of the motor, so a mere increase in the mass, although without mechanical or electrical value, and without any effect on the service capacity, will increase the nominal rating. The service capacity, as limited by the heating, depends principally on the motor losses and on the capacity of the motor for dissipating heat, both under service conditions. The service capacity is largely increased by a free circulation of air through the motor. There is no relation, therefore, between the nominal rating and the service capacity, as the two are functions of different factors.

The introduction of the interpole has given a wide extension of commutating limits, and with full ventilation the modern motor has a greatly increased capacity for dissipating heat. Modern motors show greatly increased service capacity as compared with nominal rating and the accelerating currents can be much in excess of the rated current. The maximum load permissible for short periods is now determined by the area of brush contact.

In view of the above, the comparison of railway motors on the basis of their nominal rating is misleading, and the only significance that should be attached to this rating is that contained in the A. I. E. E. definition.

Continuous Capacity

The A. I. E. E. standards state: "The continuous ratings of a railway motor shall be the inputs in amperes at which it may be operated continuously at one-half, three-quarters and full voltage respectively, without exceeding the

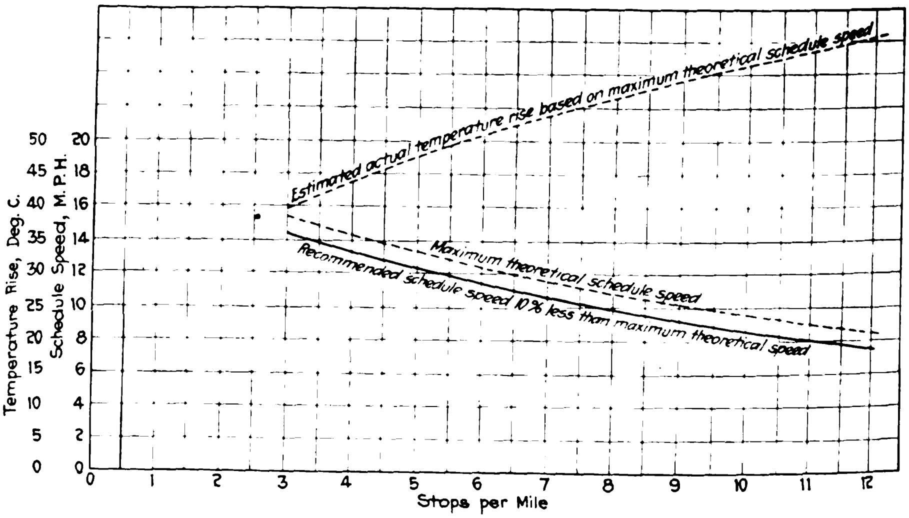


Fig. 1—Relation Between Stops, Schedule Speed and Motor Temperature

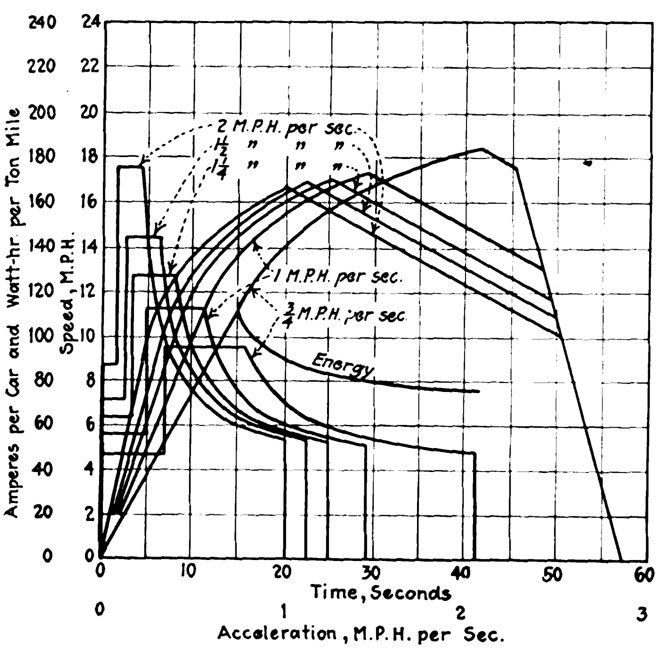


Fig. 2—Decrease in Energy as Acceleration Is Increased

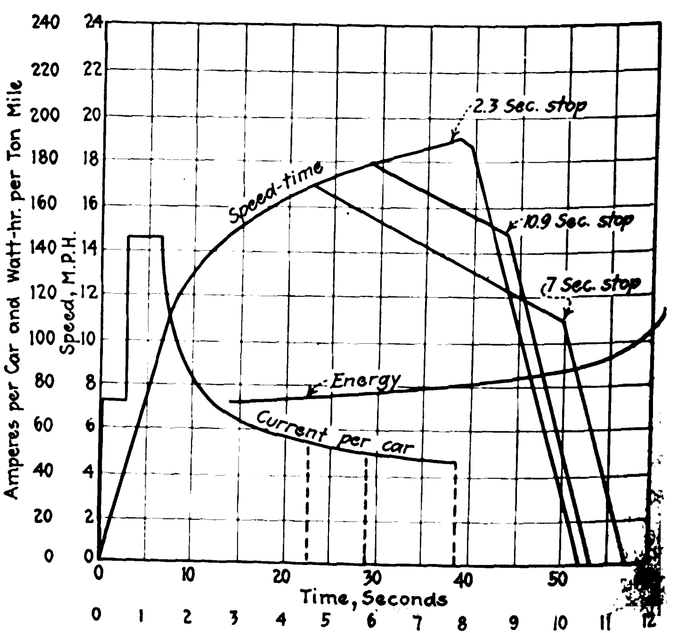


Fig. 3—Effect of Stops on Speed and Energy

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*Abstract of a paper presented at the convention of the Canadian Electric Railway Association, Toronto, Ont., June 29, 1923.

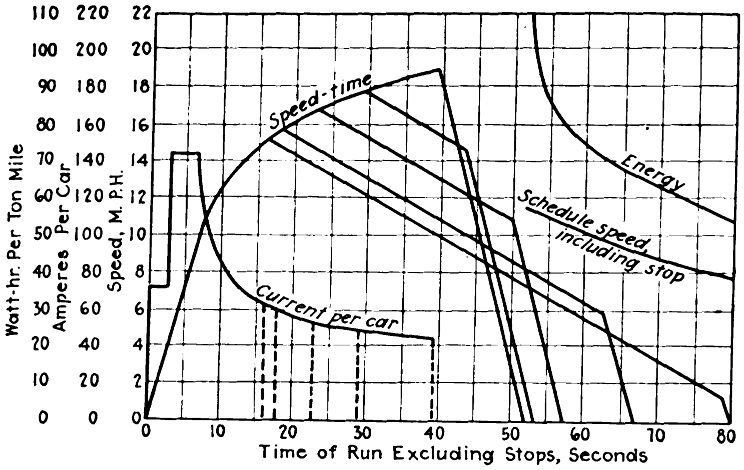


Fig. 4—Relation Between Time of Stops and Energy Consumption

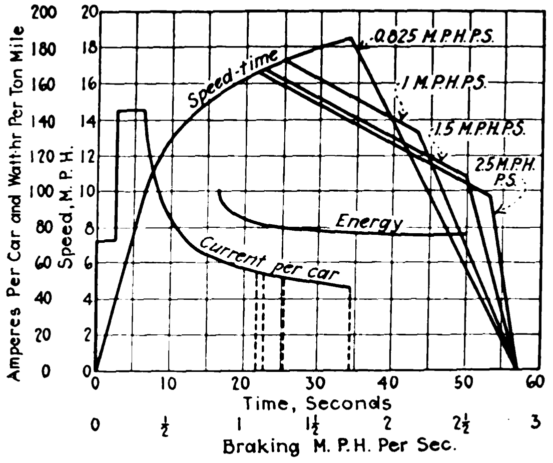


Fig. 5—Decrease in Energy with Increased Rate of Braking

observable temperature rise of 65 deg. C. for the windings by thermometer when operated on stand test with motor covers arranged as in service."

A railway motor in service goes through a series of quite irregular cycles ordinarily constituted of (1) a period of acceleration at heavy current and partial voltage, (2) a period of running at full voltage during which the car accelerates with decreasing current, (3) a period of running without power during which the car decreases in speed, which may or may not include coasting, (4) a period of rest. These periods may vary between more or less wide limits, but they will average up during a day's operation, and curves or tables can be made up from a series of tests to show the practicable schedules for a given motor under various conditions.

If for any particular service special conditions exist such as a long run with continuous grades against the car or the addition of a trailer during certain periods the run is analyzed and the equivalent heating current obtained. This is the value of the current which during the total time of the run, including accelerating, coasting, braking and stop periods, would cause a total energy loss in the windings equal to that for the run. It is equal to the square root of the average square of the current throughout the run. This is then checked against the continuous rating of the motor at the equivalent voltage, which for average conditions in city service is about 300 volts and interurban service with few stops from 400 to 450 volts.

In special cases consideration has to be given to the additional energy input to the motor during winter operation. In one case, to the writer's knowledge, this was about 15 per cent greater during winter than summer for exactly the same service.

The effect of ordinary variables on the performance may be shown best by a specific illustration. Consider a typical fully ventilated commutating pole railway motor, having a nominal rating of 35 hp. with an input of 60 amp. at 600 volts for the standard one-hour run at an armature speed of 1,050 r.p.m. The continuous ratings are 40.5 amp. on 600 volts, 39.0 amp. on 450 volts, 36.5 amp. on 300 volts.

Using four of these motors on a car weighing complete with seated passenger load 45,000 lb., the maximum theoretical schedule speed, the recommended schedule speed and the temperature rise for different stops per mile are shown in Fig. 1. The acceleration and braking are at the rate of 2 m.p.h. per second, and stops are eight seconds long.

EFFECTS OF VARIABLES ON MOTOR PERFORMANCE

Fig. 2 shows the decrease in energy input as the acceleration is increased. The higher the rate of acceleration employed the lower the energy input, and the greater the per cent of coasting becomes, in maintaining the same schedule speed. For example at 0.75 m.p.h. per sec. acceleration the energy input is 110 watt-hours per ton-mile, whereas with 1½ m.p.h. per second acceleration the energy input comes down to 80 watt-hours per ton-mile. There is very little additional saving of energy by increasing the rate of acceleration beyond 1½ m.p.h. per second. These curves are all figured with 1,000-ft. runs and seven-second stops, with 1.5 m.p.h. per second braking, giving a schedule speed of 10.65 m.p.h.

Fig. 3 shows the schedule speed and energy consumption as affected by the number of stops per mile with the same car but with the motors geared for free running speeds of 15, 20, 25 and 30 m.p.h. respectively. With say eight stops per mile, the schedule speed is only slightly increased by using the lower gear ratios, at the expense of considerably higher energy input, whereas with one, two or three stops per mile the increased schedule speed as the gear ratio is reduced is quite marked and much more commensurate with the increased energy input.

Fig. 4 shows the increase in energy consumption to maintain a given schedule speed as the time of stop is increased. For a schedule speed of 10.65 m.p.h. with a seven-second stop the energy consumption is 80 watt-hours per ton-mile, whereas if this stop

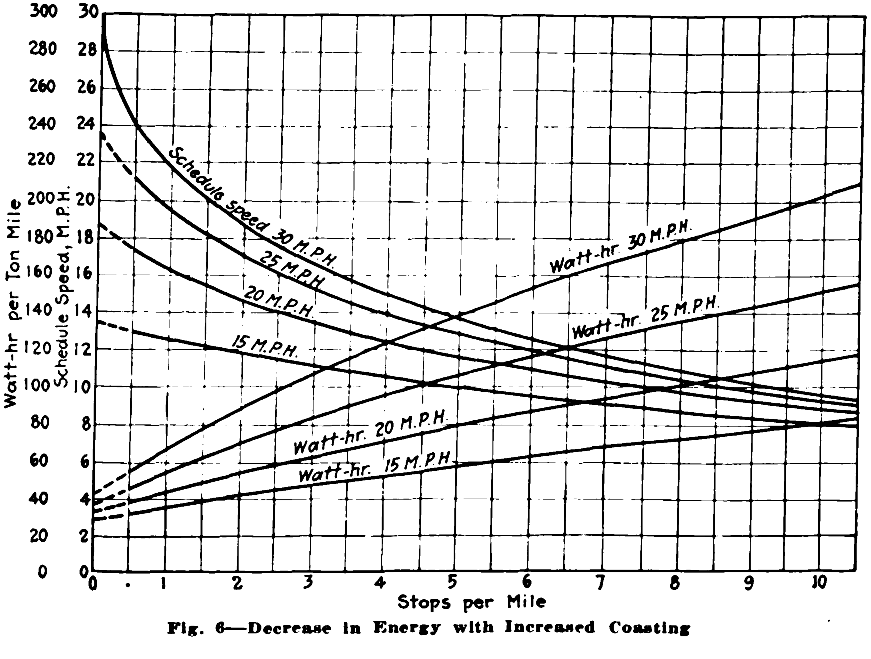


Fig. 6—Decrease in Energy with Increased Coasting

is lengthened out to 12.3 seconds the energy consumption to maintain the same schedule speed goes up to 115 watt-hours per ton-mile.

Fig. 5 shows the decrease in energy consumption as the rate of braking is increased. With braking at 0.825 m.p.h. per second the energy consumption is 100 watt-hours per ton-mile, whereas by increasing the braking rate to 1.5 m.p.h. per second the energy consumption comes down to 80 watt-hours per ton-mile. Little additional energy saving is effected by increasing the braking rate beyond 1.5 m.p.h. per second.

Fig. 6 illustrates the decrease in energy consumption, current input and schedule speed by increasing the coasting in a 1,000-ft. run. With current on right up to where braking begins the time of run is fifty-two seconds, schedule speed 11.5 m.p.h. and energy consumption 115 watt-hours per ton-mile. With the other extreme of coasting almost to a stop the time of run is eighty seconds, schedule speed 8 m.p.h., while the energy consumption comes down to 55 watt-hours per ton-mile, slightly less than half the energy required when there is no coasting.

These figures indicate the extremes between no coasting and maximum coasting in a 1,000 ft. run and show the benefits of coasting as decreasing the energy consumption, at the expense, however, of the schedule speed.

No individual factor so affects the schedule speed as the number of stops, and this point should be kept constantly in mind.

Midwest Electric Railway Association

THE Midwest Electric Railway Association, composed of operating officials and executives of electric and interurban railways in the states of Missouri, Kansas, Nebraska, Oklahoma and Colorado, and representatives of the various manufacturers or supply companies affiliated with the industry, was organized in Kansas City, in February, 1923. It is not the purpose of the association in any way to conflict with the work of the American Electric Railway Association, but those responsible for this new association felt that much good could be obtained by closer association among the electric railway officials of these states. Each of these states has a utilities association made up largely of light and power company members, but it was thought that the railway men did not get as much recognition and benefit as could be obtained from a strictly railway association.

It is the aim of the organization to comprise all of the electric railways within these states in its membership at an early date, forming a body similar in some respects to the Central Electric Railway Association, whose territory includes Indiana, Ohio and Michigan.

The association's first meeting was held in St. Joseph, Mo., June 21, 1923. About seventy members attended the one-day meeting, which consisted of a luncheon followed by a business session. Short talks on electric railway problems were made by R. A. Leussler, Omaha, Neb.; F. G. Buffe, Kansas City, Mo.; S. B. Irelan, St. Joseph, Mo.; H. B. Cobban, Miami, Okla.; and Frank V. Cook of the Ohio Brass Company. Following these talks, there was a general informal discussion.

The next quarterly meeting will be held the latter part of September at a place to be decided on later.

The executive committee of this association is composed of Ernest Stenger, Denver, Colo.; M. M. O'Brien, St. Louis, Mo.; F. G. Buffe, Kansas City, Mo.; H. B. Cobban, Miami, Okla.; R. A. Leussler, Omaha, Nebr.; S. B. Irelan, St. Joseph, Mo.; and R. B. Campbell, Wichita, Kans.

The officers of the association are: D. L. Fennell, superintendent of transportation Kansas City Railways, president; Charles W. Ford, general superintendent Kansas City, Clay County and St. Joseph Railway, vice-president; J. A. Weimer, secretary-treasurer, Kansas City, Mo.

National Fire Prevention Exposition

ONE of the outstanding features of Fire Prevention Week, Oct. 8 to 13 inclusive, will be a National Fire Prevention Exposition in New York City. At a recent meeting of the committee of the National Fire Protection Association, 25 East Twenty-sixth Street, New York, N. Y., in charge, which was attended by representatives of the various interests involved, emphasis was placed upon the necessity of featuring the physical as well as the psychological phases of fire prevention educational effort. The need for adequate building codes was particularly emphasized by T. Alfred Fleming, chairman of the committee, and action was taken to include a nationwide campaign in behalf of safe building construction and the wider use of products and devices designed to prevent fire.

At the national exposition in New York will be shown for the first time thousands of products and devices, such as fire resistive roofing, metal doors, windows, sprinkler systems, fire extinguishers, safes, electrical goods, etc. Only those products which have passed the rigid tests of the Underwriters' Laboratories will be eligible for display.

The exposition will be participated in by many important organizations and will visualize to the public what is meant by an average fire loss of a thousand dollars per minute throughout the year.

Annual Outing on July 26

The New England Street Railway Club will have its annual outing on July 26 at Canobie Lake Park, Salem, N. H. Ladies are invited. Complete information will be published later.

Wisconsin Utilities Association

THE electric railway section of the Wisconsin Utilities Association will hold its midsummer convention the first week in August at Oshkosh. The program, which is not completed, includes an inspection trip through the new carhouse at Oshkosh and an examination of the new rolling stock of the Eastern Wisconsin Electric Company.

American Association News

Executive Committee

A REGULAR meeting of the executive committee of the American Electric Railway Association was held in New York, Friday, July 13, with just a quorum present. The business conducted was largely routine reports of standing committees. Mr. Coates read an interesting report of the publicity committee, telling of the extensive activity of this committee since the last meeting of the executive committee, and indicating that some most effective publicity matter is being put out in a timely way.

The executive committee approved the following applications for membership from manufacturers: George A. Saums Company, Plainfield, N. J., wood preserving; Reo Motor Car Company, Lansing, Mich., buses; Timken-Detroit Axle Company, bus and truck axles; J. R. McCardle Company, Trenton, N. J., body builders and repairers; J. F. Hodgkins Company, Gardiner, Maine, trolley wheels and bushings. The Kennedy Engineering Corporation, consulting engineers, automotive transportation, was approved as an associate member. Several individual memberships were also approved. The resignation of the Gothenberg Street Railway of Gothenberg, Sweden, was accepted.

F. C. J. Dell reported for the exhibit committee that on July 1, 53,900 sq.ft. of convention exhibit space had been applied for, which is 100 per cent more than on July 1 of 1920 or 1922. Up to July 13, 54,827 sq.ft. had been sold.

The committee passed a resolution, prepared by Henry W. Blake and General George H. Harries, on the death of Julius S. Walsh, whose obituary appeared in the JOURNAL March 31.

Considerable discussion was had as to whether the association should indorse the National Transportation Institute. It was finally voted that the executive committee looked with favor upon the proposed National Transportation Institute in so far as the work of its technical research division is concerned.

Mr. Ellicott reported for the special committee appointed to consider the proposal of C. E. Morgan that community sections of the American Electric Railway Association be organized. After some discussion a motion was passed that the proper changes be made in the constitution and by-laws to take care of this form of membership, and that the revisions be submitted to the membership for vote at the October convention. The idea of the community section is that in any community where there are two or more member companies serving a single community, and application is made by not less than twenty-five representative men, it shall be permissible to organize a section and hold meetings comprising all of the company, associate and company section members and other employees of railways and railway manufacturers and engineers in the community, to discuss railway problems, and as a means of disseminating information about the industry. A trial of the plan will probably first be made in New York City.

The executive committee approved a recommendation made by Mr. Datz, president of the Engineering Association, that this association accept membership on the advisory board to draw up specifications in line with the recommendations of Secretary Hoover on standardization and elimination of waste in industry, for federal, state and institutional use. The engineers suggested that the present engineering committee for co-operation with the Bureau of Standards be given this assignment. This committee includes R. H. Dalgleish and C. S. Kimball of Washington, D. C., and W. W. Wysor of Baltimore, Md.

Mr. Coates suggested that the country is being flooded with publicity matter of one kind and another, and that he believed the most effective way of educating the public as to the facts in the public utility field is to interest the local companies to give a series of talks to school children. This was heartily indorsed by various members, and President Emmons was requested to address a letter to all member companies urging them to seize every opportunity to talk before school children.

The final action of the committee was to accept the invitation of Barron G. Collier to hold the next meeting of the executive committee on board his yacht, on Friday, Aug. 24, in the waters off New York.

Those present at the meeting were: President C. D. Emmons, Executive Secretary J. W. Welsh, Robert I. Todd, Charles L. Henry, Frank R. Coates, Lucius S. Stores, Garrett T. Seely, A. L. Hodges, representing C. E. Morgan; L. C. Datz, C. R. Ellicott and M. B. Lambert, representing H. D. Shute.

T. & T. Executive Committee

A MEETING of the executive committee of the Transportation & Traffic Association was held in New York on July 12. The principal business was the review of the committee reports and the tentative arrangement of a program for the meetings at the Atlantic City convention.

A letter from H. B. Potter, chairman of the committee on accident prevention, was read. He stated that the report of his committee includes a classification of the causes of accidents, and a tabulation of accident statistics from an unusually large number of member companies. The question of getting qualified speakers to discuss accident prevention at the annual meeting was considered. It was decided that the subject is of such importance that the selection of special speakers is essential to the success of the program.

The report of the committee on bus operation, W. J. Flickinger chairman, was considered. It was decided that in the convention discussion, operators of experience with bus service should be invited to speak.

The report of the committee on merchandising transportation, Samuel Riddle, chairman, was discussed with care. It is divided in five sections prepared by sub-committees, the topics being weekly passes, monthly nickel permits and commutation tickets; developing passenger, freight and express business; merchandising by advertising; utilizing employees for selling; and car design from a merchandising standpoint. It was decided to outline the discussion at the convention along the lines of these reports, the five topics being taken up separately.

Reports of the committee on one-man car operation and of the committee on traffic regulations were also received.

Those present at the meeting were G. T. Seely, Youngstown, O., chairman; L. H. Palmer, Baltimore; J. K. Punderford, New Haven; J. W. Welsh, New York; W. J. Flickinger, New Haven.

Nominating Committee

THE committee which will make the nominations for officers of the American Electric Railway Association at the next convention will be as follows: J. H. Pardee, chairman, and General George H. Harries, past-presidents; Harry Reid, W. R. Alberger and W. J. Harvie, railway members; C. J. Olmstead, Western manager Westinghouse Air Brake Company, Chicago, and S. J. Cotsworth, sales agent Lorain Steel Company, manufacturer members.

Membership Campaign

THE membership committee, W. H. Sawyer, chairman, has prepared an attractive leaflet entitled "How the Association Will Help You." This is designed to give non-member railway companies, so they may learn of the value of membership, a brief outline of the activities of the American Association, including the bureau of information and service, publicity and advertising sections, and the annual convention and exhibits. It is stated that during the last six months the association answered more than 6,000 requests for information, or 30 per cent more than during the previous year. This breaks all previous records.

Chairman Sawyer states that he will appreciate the assistance of member companies in calling the advantages of membership in the association to the attention of any non-member companies in their territory. It is suggested that an executive officer of member companies write a personal letter inclosing this leaflet to any prospective member companies in his vicinity. Additional copies will be sent upon request by James W. Welsh, secretary, 8 West Fortieth Street, New York City.

Stores Accounting Discussed

A JOINT meeting of the committee on purchases and stores of the Engineering Association and the committee on stores accounting of the Accountants' Association was held in New York on Monday, June 4. Those present were B. J. Yungbluth, W. S. Stackpole, W. H. Staub, C. A. Harris, W. B. Bell, H. H. Lloyd, J. P. Dick, W. M. Ford, representing the purchases and stores committee, and R. A. Weston and C. A. Bartlett of the stores accounting committee. It was agreed that the stock book method of controlling stocks of material and supplies should be recommended to member companies. The committee has prepared a comprehensive set of instructions for the use of the stock book, and these will be included in their recommendations. It was agreed also that the annual inventory should be complete as of one date, that the fiscal inventory should be taken by the stores department under the supervision of the accounting department, and should include such materials and supplies as the latter may designate. The material on hand should be entered in the stock book for the current month, but the method of extending the inventory and delivering it to the accounting department must depend on the practice of the individual companies.

Special Reports Available

THE Bureau of Information and Service has prepared the following special reports, which are available to member companies in good standing upon request:

Fare Bulletin—A new and revised edition of the Association's regular fare bulletin, showing fare systems in effect on both city and interurban lines; the cash fare, ticket rate, transfers issued, special children's, students' and workmen's rates, effective date and former rate, based on the replies to a questionnaire sent to all electric railways in June.

Local Regulation of Motor Buses—A survey of measures adopted by municipal authorities to restrict the operation of buses or jitneys, or to co-ordinate them with existing transportation systems.

State Regulation of Motor Vehicles—A new edition of the association's compilation of March 1, 1922, with the 1923 legislation added. Contains copies of all legislation now in effect covering the operation of motor vehicles as common carriers.

State Taxes and License Fees Paid by Motor Vehicle Common Carriers—A tabulated summary of the payments required in the various states with copies of taxation laws passed in 1923.

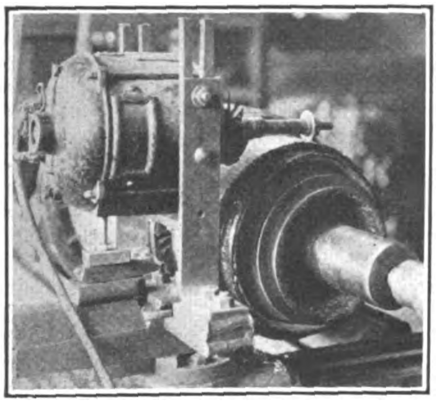
Bonuses Paid Electric Railway Trainmen—A list of companies paying bonuses and a brief description of the method of awarding them, with particular attention to bonuses given for clean accident records.

In addition to the above compilations, supplements to the wage bulletin and cost of living studies have been prepared, bringing them up to date.

Maintenance of Equipment

Fan Clears Commutator of Slotting Dust

ARMATURE slotting is done in a small lathe at the Easton shop of the Lehigh Valley Transit Company. The apparatus was designed by C. A. Doud, master mechanic, and is shown in the accompanying illustration. A small electric motor, mounted on a fixture attached to the carriage of the lathe, drives the slotting saw. The support for the slotting motor has slots to permit raising and lowering for commutators of different size. The armature to be slotted is placed in the lathe centers so that it can be rotated to the different slots as desired. A small fan made of sheet iron, attached to the shaft of the slotter, blows away the particles of copper dust so that the workman has a clear view of his work.



Slotter with Fan for Removing Particles of Copper Dust

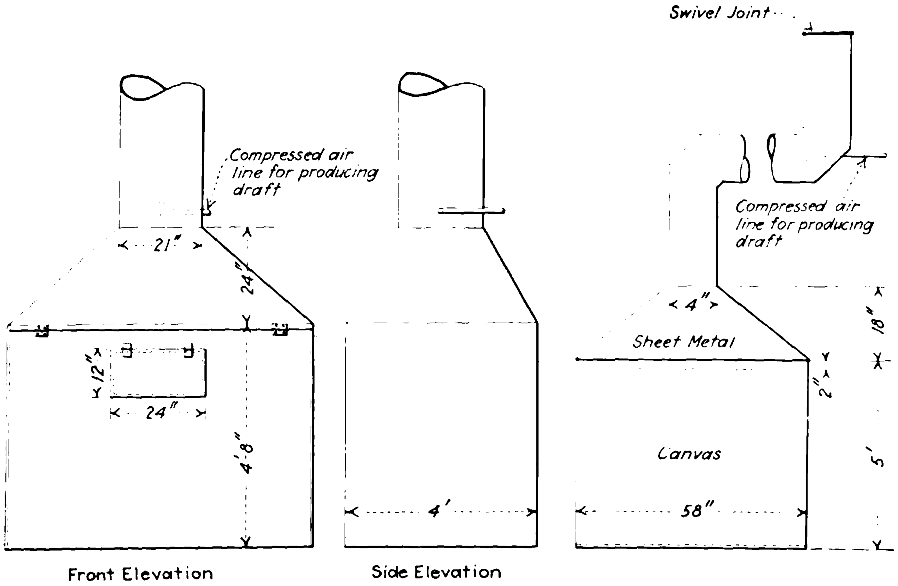
Blowing Out Motors and Motor Shells

THE Cold Spring shops of the International Railway are fitted with an ingenious device for removing metallic and carbon dust, as well as other kinds of dirt, from motor shells and armatures. Compressed air is used for this purpose, and the blowing-out process is carried on within a housing, so that the dirt dislodged is taken up a stack instead of being blown in all directions by the compressed air.

There are two of these housings in the Cold Spring shops. One housing is stationary, the other is movable. The dimensions of both are given in the accompanying diagrams.

The stationary housing is rectangular in area and is built of galvanized iron. The front is hinged at the top so that it can be raised. This front door has a small hinged opening 12 in. x 24 in.

The armature or motor shell to be "dusted out" is wheeled into place within this housing, the front is let down and the small door opened. A compressed air hose is then inserted in the opening and the carbon dust is taken up the stack through a flue, in which a draft is created by a compressed air nozzle.



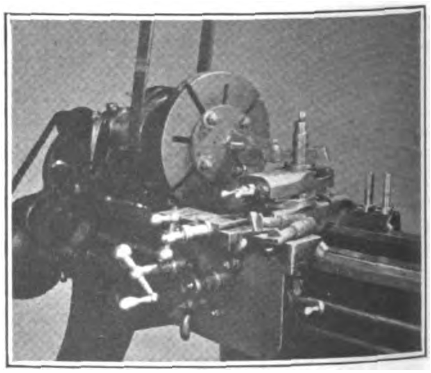
Stationary and Movable Housings for Blowing Out Motors and Motor Shells

The movable hood works on the same principle, but is circular and the lower part is of canvas instead of galvanized iron. This hood is supported on a swivel joint so that it can swing in an arc of 90 deg. or more. The hood is set in front of the baking oven. Before the motors are put in the oven they are placed on small trucks which run on one of four tracks which enter the oven. The hood is then swung around to cover the motors, the canvas sides are dropped, and the air is played through a hose below the lower edge of the canvas. A compressed air nozzle inside the stack, as in the former case, furnishes the draft for removing the dirt.

After being thus blown out the motors are run into the oven.

Milling Machine Operation Performed on a Lathe

RAILWAY shops frequently do not have all the equipment desired for performing all machining operations and hence must devise various substitutes. For example, the finishing of the broached portions of the rotary valve key of an air-brake valve would ordinarily be done on a milling machine. The accompanying illustration shows how this operation is performed economically in a lathe in the Fairview shops of the Lehigh Valley Transit Company. A special fixture for holding the valve stem is bolted to the face plate of the lathe.



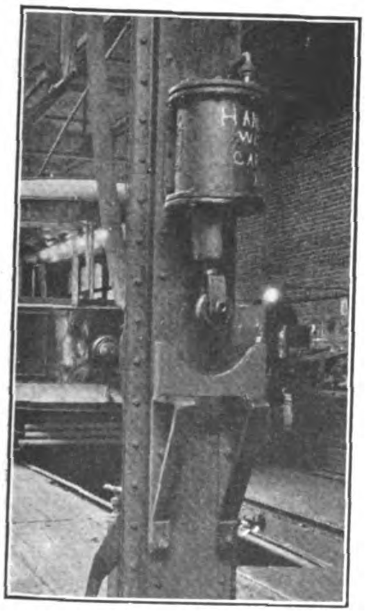
Finishing Broached Portions of Rotary Valve Keys in a Lathe

A small spirit level is used for adjusting the valve key to make certain that the surfaces to be finished for the handle fit will line up accurately with the keyed end which fits the valve stem. The finishing tool held in the tool post is started at the center of the surface to be machined and is gradually worked outward as desired while the valve key is rotated by the headstock.

Two types of valve keys are used by the railway. When the steel stems become worn a new end is built up by welding, and this is first turned to the diameter of the round part and then finished to give the desired handle fit. Composition valve stems have brass ends braised on and these are then finished in the same manner.

An Air-Operated Pipe Bender

A MUCH appreciated tool in the shop of the Terre Haute Traction & Light Company, Terre Haute, Ind., is a pipe bender in which the bending force is supplied by air pressure in a 9-in. brake cylinder. This is effective in bending conduits and other pipe for maintenance repairs up to 1¼ in. in size.


Pipe Bending Is a Pleasure with This Simple Air-Operated Device Which Is in Constant Use in the Railway Shops at Terre Haute

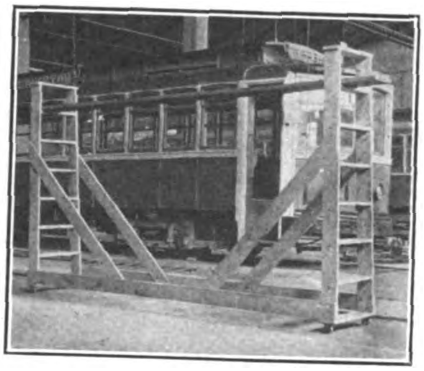
The cylinder is mounted on one of the structural steel columns of the shop building, and it carries on the lower end of the plunger rod a 4-in. roller with its surface turned slightly concave.

Supported on brackets below the cylinder is an iron block or anvil curved to a radius of about 8 in. and rounded off for bending the pipe in the manner shown in the accompanying illustration.

The valve for operating the bender is located on the side of the column to the reader's right in the picture but not visible, so that the operator can manipulate the bender with one hand while handling the pipe with the other.

A Light, Portable Platform for the Car Painter

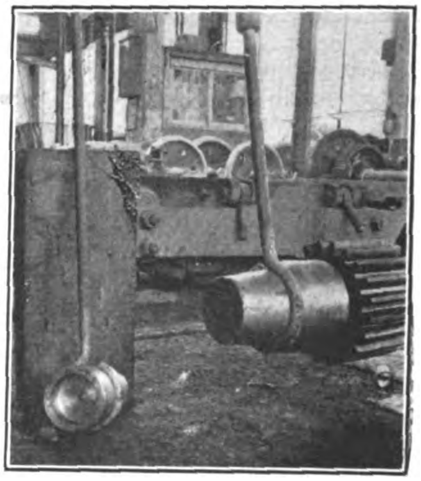
IN ELECTRIC railway paint shops much ingenuity is expended in devising for the painter platforms which will be safe and convenient. A type which admirably meets the requirements in the paint shop of the Indianapolis Street Railway, Indianapolis, Ind., is made up of two special ladders mounted vertically at the ends of a simple wooden framework and securely braced, the whole resting on four casters, by means of which it can be easily rolled about. The steps in the ladders are spaced about a foot apart, and they serve to support cross planks and also to give access to these planks. Once in position a plank cannot slide off the ladders.


The Master Painter in This Shop Thinks He Has a Portable Scaffold Design that Cannot Be Beaten

It is difficult to see how a scaffold so substantial, safe and portable could be constructed more cheaply than this one.

Steel Driver Prevents Battering of Pinions

WHEN a pinion is to be driven on a motor shaft in the shops of the Virginia Railway & Power Company, at Richmond, a simple tool made of axle steel is used to transmit the blow from the sledge to the pinion.


This Tool Is a Convenience in Driving Pinions on Motor Shafts

The tool consists of a short piece of steel, hollowed out on one end to clear the end of the motor shaft and tapered at the other end to center the blow of the sledge. A groove is turned near the middle, which serves to hold in place a ring in the end of a ¾-in. iron rod which does duty as a handle. The upper end of the handle is covered with rubber hose to absorb vibration.

Advantages of Trolley Wire Versus Feeder

BY G. H. MCKELWAY.
Distribution Engineer Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y.

ON many electric railway lines the trolley wire is of a larger section than would ordinarily be used for the type of service operated over the line. The reason for this is that the trolley wire is doing double duty. It is expected not only to perform the usual service of a conductor from which the car can receive current, but in addition it is made heavier than usual so as to lessen the line drop and do away with the necessity of running a parallel feeder.

This construction gives a slight saving in the first cost of the line because the labor cost of stringing a heavy trolley wire is not much greater than that of running a lighter one. On the other hand, the feeder construction requires additional feeder arms on the poles, feeder insulators and perhaps longer poles for those carrying the feeder arms. The feeder also will cost more per foot than the same amount of copper drawn into trolley wire.

The feeder, however, can be considered as a permanent investment, while the trolley wire will wear out after several years service and will then have to be renewed. Unless the car service is of a kind particularly suited for the heavy wire it will be found that this large wire will have to be renewed almost as soon as a lighter wire, and if the heavy wire is suited to the service it should have been used in the first place and is therefore not being made use of solely because of its value as a feeder.

Again, the trolley wire is subjected to wear and is therefore constantly losing its conductivity, while the feeder has just as large a cross-section at the end of ten or twenty years as it had on the day that it was first put up. The insulation may be frayed and damaged by the weather, but the wire itself will be in good condition, and, as feeder wire on poles is well insulated from everything else, it is very seldom that the feeder will have to be renewed merely because the insulation woven around it has been damaged.

Not only can the feeder on the poles be considered as a permanent investment, but it is also a sort of insurance to the trolley wire, because when there is a feeder in multiple with a single trolley wire there will be no danger of annealing long stretches of the latter in case of a ground at a distance from the feeding-in point. With only a single wire, that wire will have to carry all of the current in case of a ground, while if there is a feeder in multiple with the trolley wire, the latter will carry all of the current only for the short distance between the ground and the nearest side feed tap.

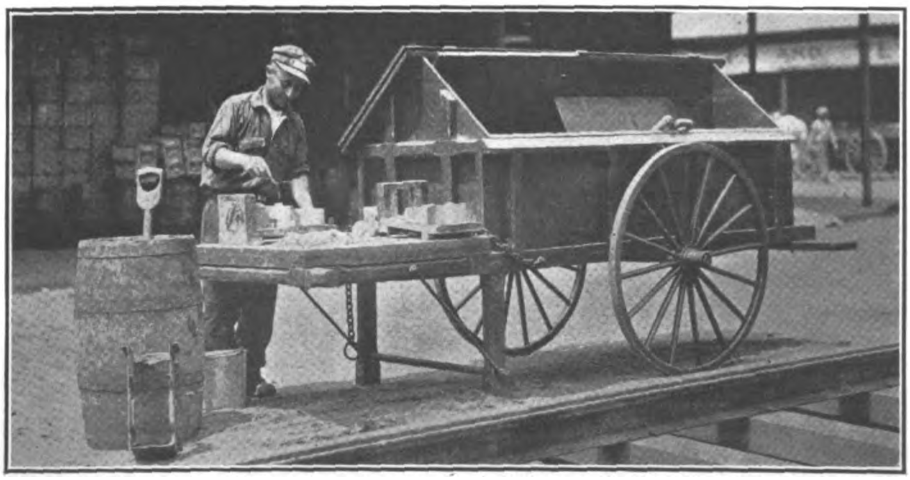
On the whole, it would seem that it is seldom good policy to increase the size of the trolley wire in order to use it as a feeder, as the separate feeder will pay for itself in the long run and will give better service.

New Equipment Available

Handy Platform Used in Rail Welding

THE tool box supplied by the Metal & Thermit Corporation, New York, for use in Thermit rail welding, has recently been equipped with a platform for ramming two-part molds which are applied to the rails preparatory to welding. This innovation, shown in the accompanying illustration, provides a convenient and suitable platform for such work.

The platform can easily be moved from place to place as the welding progresses. The molds can be rammed quickly, near the point of their application, and thus the speed of rail welding is considerably accelerated.



Molds Are Rammed on This Convenient Platform

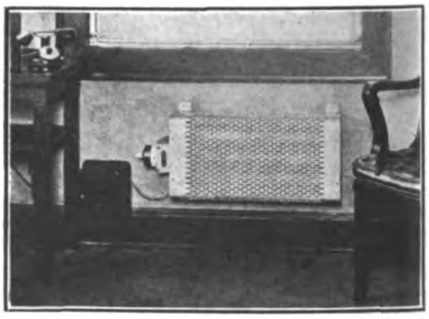
Grinding and Polishing Machines with Ball and Roller Bearings

THE St. Louis Machine Tool Company, St. Louis, Mo., is now arranging all its grinding and polishing machines to use ball and roller bearings. These bearings are made so that they can be readily assembled, and troubles from worn arbors are eliminated. The manufacturers are using a new method of applying the bearings to the machines which permits of easy removal when it is necessary to replace balls or races.

New Electric Heater

THE Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has recently placed on the market an electric air heater designed for use in such places where a gas flame would be undesirable and dangerous. It may be used for heating shops, offices, warehouses, etc., and is especially useful for heating isolated, hard-to-heat places, such as watchmen's houses and oil storage houses.

The outstanding feature of this heater is convenience. It is light, attractive and easy to install. It may be located anywhere without regard to flues or gas lines. It is very easy to operate, the temperature being regulated by a convenient three-heat snap switch.



Electric Heater Installed in Office

A heater may be placed in an inclosed room, surrounded by inflammable materials and there will be no danger of fire caused by the heater. It can be depended upon to function perfectly month after month without danger.

The heating elements consist of space heaters, firmly mounted on a steel framework. A polished aluminum reflector on the back of the heater protects the wall and directs the heat out into the room where it is used. A perforated metal cover protects the heating elements from accidental injury. The heater is protected from moisture by enamel paint being baked on the aluminum surface.

The air heater is supplied in either 1,000-watt or 2,000-watt capacity and for use on either 110 or 220-volt circuits. A marine type of heater is provided for use in places where there is an excessive amount of moisture present. This type is provided with a brass cover and all steel parts are sherardized.

The News of the Industry

Engineer Wants System Transformed

Expert for Toledo City Plan Commission Wants $1,000,000 Spent for New Work—Buses Proposed

Complete transformation of the transit system at Toledo has been recommended in the plan submitted by E. O. Mills, St. Louis, consulting engineer of the city plan commission, in order to benefit under the Milner ordinance, which provides that the Doherty interest must bring in $1,000,000 for extensions and betterments this summer.

Members of the street railway board of control, the commissioner, and some of the city officials believe that the new plan will necessitate the raising of $1,500,000 or more to carry out the details. For that reason conferences are now being held to try to make the schedule of improvements fit with the money which will be available.

The time limit for approval of the general plan by the City Council is Aug. 1. Before that time the plan must be approved by the board of control.

One of the most revolutionary changes in the new plan will be the operation of bus routes in the city by the traction company and the barring of all individual and independent operators—making the entire transit system a monopoly under regulation of the City Council.

This would mean the taking over of three or four established lines in the city. Buses will continue to be operated as feeders to the traction lines on some routes.

A crosstown bus line is a new feature. It is estimated that this new crosstown line will require at least thirty buses each capable of carrying at least twenty passengers and to operate on an eight-minute headway. The cost is estimated at $7,500 to $8,000 for each bus purchased.

Some of the other features of the plan are: Extension of the Bancroft line to Ottawa Park and elimination of part of its present belt line; extension of the Cherry Street line and linking of it with the Dorr line; breaking up of Long and Short Belt lines into radial lines; abandonment of Indiana line entirely; linking of Western and Stickney lines with bus feeders added; abandonment of Michigan line and development of Erie line, and general rerouting of cars in the downtown district to do away with left-hand turns at important corners.

The plan also includes one with a short loop for all interurban cars into the downtown station and elimination of turns at congested corners. Mr. Mills said:

> There are at present twelve bus lines operating in Toledo. All but two of these—the Oak Street and Erie Street lines—are privately owned and operated.
>
> Without exception every one of the private bus lines is in direct competition with the transit lines, for parts of their lengths at least, though several serve districts not otherwise provided with transit service—for instance, the Ottawa bus line. Approximately 80 per cent of all bus service is a duplication of the service already provided by transit lines.
>
> It is true that the buses are operating at a lower rate of fare than trolley lines, but when you consider the type of carrier being used by most bus lines, their taxes and obligations to maintain service, the reason is quite evident.
>
> The greater the competition of the private bus with the car lines, the greater will be the cost of operating the transit system, for which the riding public using the transit lines must ultimately pay.
>
> No one in Toledo will deny, in view of experience, that the buses cannot adequately serve the city's transit needs. There is only one way in which the city can be served satisfactorily and economically, and that is by the unification of all facilities.

The revised plan of transit betterments will probably go before the Council in a few weeks.

Any wholesale abandonment would tax the depreciation fund heavily for many months.

Ottawa Employees Accept Company's Proposal

After nearly two months negotiations, a number of mass meetings and a constant threat of strike if the company did not accept the award of the board of conciliation, the employees of the Ottawa Electric Railway recently voted to accept the company's proposal, which is a renewal for one year of the agreement that became effective on May 1, 1922. The agreement means that there will be no change in wages or operating conditions before May 1, 1924.

On May 1 last a board of conciliation, appointed under the industrial disputes act of Canada, awarded the employees the eight-hour day and an increase of 6 cents an hour over the present maximum rate of 48 cents, the increase being granted to make the daily wage for eight hours the same as was formerly earned in nine. The company refused the majority report of the board, taking the ground that it could not be put into effect without an increase in fares and it did not consider that the eight-hour day was a necessity in the street railway business. The company refused, therefore, to take any step toward an increase in fares for that purpose. Negotiations have been going on since and resulted in the recent acceptance of the award by the employees.

The company's contention in dissenting from the award of the board was referred to in the ELECTRIC RAILWAY JOURNAL, issue of June 9.

Engineers Report on Accident

Expert Board Finds Brooklyn Elevated, Including Rails, Frog and Switch, in Safe Operating Condition

Expert evidence has been presented to President Menden of the Brooklyn-Manhattan Transit Corporation by a board of engineers employed by the company, to the effect that the members found the track structure at site of the recent elevated accident, including rails and timbers, in a safe operating condition and not such as would require early renewal, except in so far as repairing the damage caused by the accident.

The board that so reported was composed of J. Vipond Davies, president of Jacobs & Davies, consulting engineers; I. W. McConnell, vice-president of Dwight P. Robinson & Company, Inc., consulting and construction engineers; Louis H. Bean, vice-president of Dwight P. Robinson & Company, Inc., and George H. Pegram, chief engineer of the Interborough Rapid Transit Compnay. The report of the members, all of whom signed the report, was presented on June 29.

The members of the board said that when they viewed the structure a short section of the guard rail had been either removed or torn out by the accident, but that the remaining portions, indicating the extent to which the guard rail had operated to sustain the trucks of the cars, showed that it was sufficiently good material to perform, and did perform, all of the services that could be expected of a guard rail. They concluded their finding as follows:

"The said structure, including rails, frog, switch and timbers, was in safe operating condition."

A special meeting of the board of the railway was called for July 3 to report on the accident. Mr. Dahl, chairman of the executive committee, said that before laying before the members the engineering data and detailed reports he desired briefly to summarize what appeared to be the known facts and to present for consideration certain recommendations.

After reviewing the known facts of the accident, as reported previously in the ELECTRIC RAILWAY JOURNAL, Mr. Dahl said that the accident was the first of its kind to occur on the Brooklyn elevated lines, and so far as he had been able to ascertain was the first of its kind in the history of elevated operation in Brooklyn or in any other city. He then said that an investigation was at once started by the operating officials of the company and that as soon as the reports and evidence could be sifted, which was about midnight of the day of the accident, a preliminary statement was given out covering only the immediate facts of the accident as then ascertained. It was stated at that time, however, that the cause of the derailment had not been ascertained and that the investigation would continue in co-operation with the public authorities to ascertain the cause. Mr. Dahl then said:

> The preliminary investigations indicated that the motorman of the train was in no way to blame. He was an experienced motorman with a good record. His train was operating at normal speed on a straight track, and the signal at the crossover where the accident occurred showed green and the switch was set clear. An examination of the switch and the signal after the accident showed that both were in perfect working order, and have, as a matter of fact, been continued in operation ever since.
>
> The track structure at the point in question is the standard elevated structure prevailing throughout the city and in other cities, except that the guard timbers on the Fifth Avenue Line, including the point of the accident, are 8 in. high, whereas the guard timbers on the newer elevated structures, including the elevated portions of the city-built subway lines, are only 6 in. high. The entire timber deck of the Fifth Avenue Line, including the portion where the accident happened, was rebuilt new in 1912-13, and had been maintained since that date in accordance with established practice with replacements as shown to be required by inspection. In other words, the timber deck in question, including the guard rails, had been in place not more than ten years, considerably less than its average life as demonstrated by experience in this and in other cities.
>
> The two cars constituting the train had been maintained and inspected in accordance with established standards. The two cars were in the inspection shop on June 15 last, ten days before the accident, and after inspection were reported in good condition. Since the inspection, the cars have traveled less than 1,000 miles. On the day of the accident the two cars had made nine trips over the same line past the point of the accident without giving visible indication of the development of any defects.
>
> ### WILLIAM BARCLAY PARSONS RETAINED
>
> In order to check up and report to your board on the general condition of this and other elevated lines of the company, your officers have also retained the services of the engineering firm headed by William Barclay Parsons, the distinguished engineer who designed and built the first city-built subway system, and that firm is now engaged on a comprehensive examination of the company's properties.
>
> In the meantime, at least three other investigations as to the cause of the accident and the condition of the structure are under way. One of these investigations is under the direction of the District Attorney of Kings County, another is under the direction of the engineers of the Transit Commission and the third, we understand, is to be conducted by a committee designated by the Board of Estimate and Apportionment.
>
> It is the judgment of your officers, in which it is felt certain that all the members of the board will concur, that everything humanly possible should be done to ascertain the cause of the accident and unearth whatever imperfections may exist in standards of construction, equipment or maintenance, to the end that the possibility of a recurrence of such an accident will be reduced to a minimum. The members of this board have undertaken the public duty and responsibility of operating these properties, with no connection with the past and with responsibility only for the future. The task of operating the transit properties of the city under existing conditions, with which all are familiar, is beset with difficulties almost without parallel, and in the efforts of this board to ascertain the causes of the accident and to profit thereby, to the end that operation of the lines may if possible be made safer for the future, the members of this board are entitled to and should receive the co-operation of all public authorities.

It was therefore recommended by Mr. Dahl that the board approve the action taken by the officers of the company as set forth above, and that the officers be instructed to continue in co-operation with all of the public authorities their investigations into the causes of the accident.

Franchise Terms Reviewed

New Car-Bus Ordinance in Saginaw Provides for Ten-Cent Cash Fare, Option to Purchase by the City—Calls for Expenditure of $400,000 for Rehabilitation Purposes

AS WAS reported in the ELECTRIC RAILWAY JOURNAL, issue of June 30, the Saginaw car-bus franchise was approved at a special election held on June 25. The new franchise is a modification of two grants which were submitted on Nov. 7 and again on April 2. The franchise gives to Otto Schupp, trustee, a fifteen-year grant to operate both motor bus lines and electric railway lines, with the privilege of supplying additional motor bus lines or car lines from time to time.

The rates of fare will be as follows: Regular ticket fare, four for 25 cents; cash fare, 10 cents, and school children's ticket fare, six for 25 cents. These rates of fare are to continue in full force and effect during the entire life of the franchise granted by the ordinance.

On the type of transportation equipment the ordinance specifies that the equipment shall be standard and first class and that the buses shall seat approximately twenty-five persons. The seating capacity of buses, however, may be changed by the Council when considered reasonably necessary. The specifications of all buses must be submitted to the Council before purchase or use. If either buses or cars become impracticable or obsolete the Council is to have the power to require the grantee to substitute such new method of transportation as will adequately serve the people.

The frequency of the service, the routes to be traversed, and the number of cars or motor buses for each particular route with the capacity, ventilation, etc., are to be subject to the supervision and approval of the City Council.

Section 7 of the ordinance states that within one year from the date of the acceptance the grantee is to expend not less than $400,000 in laying new track, purchasing buses and making other improvements necessary to put the property in good operating condition.

On the question of paving, Section 9 stipulates that the grantee shall keep in repair the pavement on all public ways on which its tracks are, or shall be located between the outer rails and for a space of 12 in. outside with such material as the City Council may order. Further, all pavement torn up or damaged by the grantee in the work of repairing its tracks is to be replaced at the sole expense of the grantee in as good condition as the original and with the same kind of material. In all paved public ways occupied by its tracks, whether such public ways are paved at the time the ordinance became effective or subsequent thereto, such repairs to pavement are to be made by the grantee on thirty days written notice from the Council.

The grantee is not to be required at any time to pay for new paving or repaving of any public way or any part thereof upon which its tracks are now or shall be laid. Whenever the grantee shall lay or relay tracks on any public way the city is to provide immediately, at its own cost and expense, the necessary paving or repaving. However, the grantee shall pay for the cost of any extra ballast or foundation. The laying of new tracks or the changing of the location of present tracks is to be made from time to time by the mutual agreement of the grantee and the City Council.

Section 12 states that the city may permit the joint use of the grantee's tracks located in the public ways of the city by any other public utility or by the city itself upon reasonable terms and upon payment of reasonable compensation.

The ordinance provides for the preservation of the benefits of interurban service to the city, and the grantee agrees that the interurban passenger and freight cars owned by it or by others may be operated over its own lines at a proper charge. The grantee, however, is not to be allowed without the consent of the City Council to operate freight cars in the downtown district after a period of one year from the date of the ordinance.

According to the terms of the new franchise the board of directors of the company is to consist of nine members, not fewer than two-thirds of whom are to be resident citizens of Saginaw. Directors so elected to the board are to be approved by a majority of the men occupying the positions of Mayor of Saginaw and Judges of the Saginaw County Circuit Court, with an alternative provided in case any one of the others is unqualified. The management of the company operating under the ordinance is to be separate and distinct from every other public utility in Saginaw and have separate offices and officers.

Section 16 says that before the grantee shall have the right or power to assign the franchise provided in the ordinance, all unpaid taxes of the Saginaw-Bay City Railway, a Michigan City corporation, due the city of Saginaw, together with accrued interest thereon, shall be paid in full.

In the event of disagreement between the grantee and the City Council, all questions will be referred to a board of three arbitrators.

The ordinance provides for the right of the city at any time to buy the railway or other property within the city and such portion as may be beyond the city limits, provided the same is actually and necessarily a part of the local service. If a just and reasonable price cannot be mutually agreed upon for the property, then the price to be paid is to be determined by the board of arbitrators recently mentioned. In arriving at the price to be paid for the grantee's property, no value is to be placed upon the franchise contract. As soon as the price has been determined the Council is to submit to a vote of the people the question of whether or not the property and rights of the grantee shall be purchased by the city. In the event of the purchase being made by the city the purchase price is to be raised by the issuance of bonds or in any other manner permitted by law.

On the subject of competition, the city agrees that immediately upon the acceptance of the ord'nance by the grantee, it will prohibit and prevent the operation of jitneys, buses and motor vehicles in competition with the service to be rendered by the grantee. This, however, does not extend to freight and merchandise transported by motor truck or to the operation of taxicabs within the city.

Operation by the grantee can start at the earliest possible date and, as nearly as may be, within four months after the acceptance of the ordinance. The right is reserved to the city, however, upon a vote of three-fifths of the Council electors to revoke the grant if the grantee has willfully or unreasonably neglected to comply with the provisions of the contract.

The ordinance is to be assigned by the grantee named herein to a company, to be organized under the laws of the State of Michigan, to be called the Saginaw Transportation Company or some other suitable name. This company is to be organized within ninety days from the date of approval of the ordinance by the electors. The grantee, however, cannot assign the ordinance until the new company has been organized and has in its treasury the sum of $400,000 in cash.

It is nearly two years since the Saginaw-Bay City Railway suspended service. Since then it has been a question whether the jitneys or the street cars would provide the transportation for the people of Saginaw. Franchise grants submitted on Nov. 7 and on April 2 lacked only a few votes of the required 60 per cent. When the new city administration took office on April 9 steps were immediately taken to eliminate from the other contracts features that the present Council members thought had been the cause of the previous failures of approval. As soon as the finished document was approved by the bondholders' protective committee of the bankrupt Saginaw-Bay City Railway the Council resubmitted the measure.

Rochester Canal Line Will Be Operated by City

At a conference of the Mayor and his executive aids, it was decided that the new rapid transit line to be installed in the city of Rochester, N. Y., in the abandoned canal bed, will be operated by the municipality rather than by the New York State Railways. The lease of the line to the railway had been considered, but the conference voted to operate the road under city control.

The proposed route will relieve traffic congestion on Rochester business streets by the operation of interurban cars over the new route, using the old bed of the Erie Canal.

This is an innovation that has aroused a great deal of interest generally. It has been outlined in previous issues of the ELECTRIC RAILWAY JOURNAL.

Employees Receive Three and a Half Cents Increase

An agreement was reached between the Tri-City Railway, Davenport, Iowa, and its employees by which the employees are given an increase of 3½ cents an hour and the strike which had been threatened at various times since the arbitration began was averted. R. L. Smith, general manager, announced that the men on the Davenport side had agreed to the increase of 3½ cents an hour and that the contract had been signed. The new scale is retroactive from June 1 and is for one year from that date.

The settlement on the Illinois side was reached at a conference between G. G. Engstrom of Moline and H. E. Wendell of Rock Island, representing the men, and T. C. Roderick, Illinois general manager, representing the company. The committee had been given power to act by the men at a mass meeting. The car men had asked for a maximum of 75 cents an hour at first, but later cut this to 60 cents. This increase also is effective from June 1.

The new wage scales, an increase of 3½ cents an hour in each case, follow: Operators, first six months, 54½ cents; second six months, 56½ cents; after one year 58½ cents.

Presentation of Chicago Wage Case Begun

Arbitration of the wage dispute between the Chicago Surface Lines and Chicago Elevated Railroads and their employees began on July 9. The arbitration board began consideration of the surface lines case first. Daily hearings are being held in the City Council chambers in the City Hall.

The union, which is seeking an increase from 70 to 80 cents an hour, began presentation of its case. This, it was announced, will take several days. William D. Mahon, international president of the carmen's union, made an opening plea in which he charged the effort to maintain present wages is supported by the financial interests in general.

The first and only witness on the opening day of the hearings was Arthur Sturges of Washington, D. C., an economist. The evidence presented indicated that the union representatives are not seeking to substantiate a "living wage," but rather a demand that they receive wages which would allow a decent "living standard."

President Mahon has had prepared a budget showing what a street car man's family can buy on the 80 cents an hour asked, the father working 313 days a year. The budget is for a family of five, father, mother and three children. The principal items in this tabulation follow:

House rent with fuel	$728.00
Gas and electricity	84.00
Employee's uniform and other clothes	126.00
Wife's clothing (allowing no coat).	142.00
Children's clothing	75.00
Shoes for family	53.50
Union dues	18.00
Food	470.00
New furniture (including kitchen utensils)	136.40
Life insurance	25.00
Christmas extras	15.00
Physician and dentist	35.00
Recreation	27.00
	$1,934.90

Mr. Mahon said:

> Our men working 313 days a year at 80 cents an hour can earn $2,003.20 a year. The budget we have prepared is not on what we believe to be a proper standard of living, but on the 80 cents an hour we have asked. We believe our men and their families should have some of the luxuries in life. Those may come later.

Another Committee on Public Utility Information Organized in South

The Louisiana-Mississippi Committee on Public Utility Information has been organized. Announcement to this effect was made on July 6 by W. J. Aicklen, chairman of the committee, at the first get-together of the membership of the organization in New Orleans to develop plans for the work to be done the first year.

The membership includes the principal public utilities of Louisiana and Mississippi, embracing electric light and power companies, electric railways, gas, telephone and water companies. All privately owned utilities are eligible, and it is expected that practically all will join as soon as the work gets under way.

The personnel of the committee follows: W. J. Aicklen, Jr., Consumers Electric Light & Power Company, New Orleans, chairman; W. E. Clement, New Orleans Public Service, Inc., secretary; Frank J. Duffy, Southern Railway & Light Company, Natchez, Miss.; E. S. Myers, Vicksburg Light & Power Company, Vicksburg, Miss.; A. D. Patterson, New Orleans Public Service, Inc.; F. J. Schwab, New Orleans Public Service, Inc.; C. A. Stair, Cumberland Telephone & Telegraph Company, New Orleans, and Thomas Walker, Baton Rouge Electric Company, Baton Rouge, La.

Dr. H. M. Blain, head of the department of journalism of Tulane University, has been named director, with Sam B. Dunbar as assistant director. Headquarters of the committee are at 420 Maison Blanche Annex, New Orleans.

Contract Proposed for Sixty-Day Operation

Citizens of Amarillo, Tex., have opened negotiations with the city and owners of the Amarillo Traction Company with a view to having service continued, and indications are that a temporary arrangement will be made by which service will be continued for a period of sixty days and possibly longer. The city of Amarillo has operated the railway for the last three years under lease, or since the line suspended operation. A recent survey of the property by City Manager Banks Jones disclosed that at least $70,000 will be required to put the system in condition for continued operation. The present contract expired on July 5. When the city manager made his report to the City Commission, he was instructed to notify the owners of the property that the city would not care to renew its lease or to undertake to operate the property longer. The plans of the city at that time were to grant permits for the establishment of motor bus lines in the city.

When the commission's decision became known, a committee of business men got the city's approval of a plan for operation of the street cars for another sixty days by the city. The committee then was instructed to confer with the owner of the property, and get his approval of the proposed agreement.

Accident on Hudson & Manhattan Line

A westbound Hudson-Manhattan Railroad tube train ran into an empty Pennsylvania train at noon on July 11 at the yards between Harrison, N. J., and Manhattan Transfer stations. A boy was instantly killed; another boy suffered a fractured skull, and about sixteen other persons were less severely hurt.

The accident was due, according to the report of the Pennsylvania Railroad, which owns and operates the line exclusively at this point, to the failure of Frank Herbert, motorman of the tube train, to obey two signals which were set against him, warning him that a deadhead train was being switched at the yards.

The two cars—the front one of the tube train and the end one of the deadhead—left the tracks but remained upright.

Jitneys Restrained in Schenectady

The Schenectady trolley strike has now settled itself down to the final lap of a test of endurance by the company, the striking employees and the public.

On July 9 Supreme Court Justice Edward M. Angel of Glens Falls granted a sweeping temporary injunction restraining the 900 or more jitneys operating in the city of Schenectady from competing with the railway. The order was made returnable for final argument on Aug. 25. The traction company is busy preparing copies of the order and will commence individual service thereof on the jitney operators within a few days. Continued operation by a jitney driver after service of a copy of the injunction order upon him makes the operator liable to contempt of court.

Lieutenant-Governor George R. Lunn, former Mayor of Schenectady, simultaneously with the granting of the injunction order, abandoned his efforts to bring about a settlement, stating that he could find no common ground for arbitration.

News Notes

Safety Council Formed.—The Memphis Safety Council, composed of commercial and professional men, city officials and public utility representatives, was formed at a recent meeting. E. W. Ford, vice-president of the Memphis Street Railway, was unanimously elected president. W. W. Holstead of the Yellow Taxicab Company was made first vice-president.

Must Operate or Remove Tracks.—The Public Service Railway has been ordered to remove its tracks or to operate cars within the next six months in Trumbell Street, Fifth Street and West Jersey Street, Elizabeth, N. J., under a resolution passed by the Board of Works. The company claims that it does not receive sufficient revenue from the lines on the three streets, and the board contends that the franchise provides for forfeiture unless service is given.

Attempts Made to Unionize Men.—A mass meeting was called at the Labor Lyceum, Brooklyn, on July 2, for the purpose of forming plans with respect to unionizing the employees of the Brooklyn-Manhattan Transit Company. Although 14,000 men are employed on the subway and surface lines of the company fewer than 100 men were present at the meeting. P. J. O'Brien, vice-president of the Amalgamated Association, said that the organization work was started on May 1 after he had received a letter from twenty-two B. M. T. employees who said the men wanted to be unionized.

Men Make Demands.—Negotiations are taking place between the management of the Montreal Tramways and representatives of the men on the demands of the men for shorter hours and the same wage scale. The tramway men are seeking an eight-hour day and the same weekly or fortnightly wage that they have received on the present ten, eleven and twelve-hour day. They are also asking overtime at the rate of time and a half for any time over the eight hours. The present rates are 39½, 44 and 48 cents an hour for first, second and third year men respectively. Judge St. Cyr, president of the Tramways Commission, stated recently that whatever the outcome of the negotiations there would be no increase in fares on the tramways.

Foreign News

According to a proposal by a committee of the Glasgow Town Council an experiment is to be made to render the tunnels of the subway watertight. The Francois Cementation Company, Doncaster, England, is prepared to carry out what is called the cementation of over a quarter of a mile of specially leaky tunnels at an estimated cost of £6,700. The company is to receive no remuneration beyond the actual cost if the reduction of water is below 60 per cent of the total, and it will receive payments on a scale proportionate to the reduction above that amount. If the experiment is successful the company will bid for the remainder of the work on a contract basis, or if desired on the same basis.

Some hope was held out in House of Commons on June 14 for steps to be taken to electrify the suburban lines of the London & North Eastern Railway, and to construct extensions northward of the present "tube" electric railways, the present northern terminus of which is at Finsbury Park. A bill promoted by the above-named railway was before the House for second reading. Its provisions have nothing to do with London, as it deals with proposed railway improvements in the north of England.

For a considerable time there has been a popular agitation for the extension northward to outlying towns of the London tube railways which now terminate at Finsbury Park, but so far without any result, as the railway companies do not think such extensions justifiable on financial grounds. Recently more than 30,000 signatures to a petition for the extension have been obtained for presentation to the Ministry of Transport. The latter replied that it had no compulsory powers in the matter, and no effective steps could be taken until a definite scheme was prepared for submission to Parliament.

At an inquest regarding the recent serious tramway accident at Leeds, when a car ran away down hill, left the rails, and crashed into a wall, whereby several passengers were killed, the jury expressed the opinion that the car got out of control as a result of the driver losing his nerve when he found that the hand brake would not act, this lack of response being due to a defective ratchet, and that the driver forgot to apply the power brakes. The latter were found to be in good order.

The Manchester tramway department has introduced a new arrangement for indicating tramcar stopping places by means of large disks attached to the overhead wires. An oval disk in the center indicates compulsory stopping place for cars going either way. An oval disk at the side marks a compulsory stop at the side where the disk is fixed. A rectangular disk indicates request stops.

Financial and Corporate

Traffic and Earnings Increase

Recent Operating Costs Show Rising Tendency, but Increased Volume of Riding Is Counteracting Force

The favorable conditions reflected in the reports of the electric railways for the closing months of 1922 have continued into the new year and results obtained have improved with each passing month, but the outlook for the remainder of the year is somewhat doubtful. These facts and this conclusion are the result of a study of operating returns made by Edmund J. Murphy, chief statistician of the American Electric Railway Association. Mr. Murphy refers to the numerous wage increases which have recently gone into effect, and the demands for other increases now pending before arbitration boards. As he sees it additional increases are certain to result and all of this means a heavy drain on the industry's resources. In addition, the prices of materials and supplies are also substantially higher, thus adding still further to the cost of operation. This is a statement of the unfavorable elements. As an offset to all this, however, the returns show that the companies are doing an increased amount of business.

TREND OF ELECTRIC RAILWAY EARNINGS

	† Total January to December			‡ Total January to April		
	1922	1921		1923	1922	
Operating revenue	$327,679,709	$334,635,523	*D* 2.08	$104,883,554	$101,297,964	*I* 3.54
Operating expenses	236,562,147	249,929,480	*D* 5.35	75,353,102	73,488,407	*I* 2.54
Net revenue	91,117,562	84,806,043	*I* 7.44	29,530,452	27,809,557	*I* 6.19
Operating ratio	72.19%	74.69%	*D* 3.35	71.84%	72.55%	*D* 0.98
Taxes	21,525,246	21,352,512	*I* 0.81	7,468,317	6,934,557	*I* 7.55
Car miles	718,114,196	718,829,847	*D* 0.10	228,337,157	220,137,976	*I* 3.72
Passenger revenue	315,051,096	322,551,280	*D* 2.33	100,802,977	98,051,562	*I* 2.81
Revenue passengers	4,319,585,163	4,310,681,838	*I* 0.21	1,413,462,354	1,325,529,659	*I* 6.63
Average rate of fare	7.29 cents	7.48 cents	*D* 2.54	7.13 cents	7.40 cents	*D* 3.64

D Decrease. *I* Increase. † Based on reports of eighty-one companies. ‡ Based on reports of eighty companies in January, seventy-nine in February, seventy-six in March and sixty-seven in April.

The lowest point of the operating expenses was reached in December and since that time the trend has been upward. Increased traffic, however, has produced greater revenue, and during the first four months of 1923 this has been more than enough to offset the rise in expenses. The operating ratio in consequence has continued to drop and as this ratio is a measure of the underlying condition of the industry it can be said that the industry is in a stronger position today than it was at the end of 1922, and in fact than it has been at any time since 1916. And in comparing it with 1916 this difference should be noted. Then the trend was downward. Today it is upward. This is distinctly encouraging.

Since May, 1922, there has been a steady increase in the number of revenue passengers carried. Previous to that time traffic had been suffering from the heavy business depression which occurred in 1921 and its accompanying period of unemployment. With the resumption of good business conditions in the second half of 1922 electric railway traffic began to pick up, and in the early part of 1923, with production near its peak, recovered rapidly.

With increased traffic of course came increased revenue. The increase in revenue was not in proportion to the increase in the number of passengers. Mr. Murphy sees the reason for this in a very perceptible, although very gradual, decrease in the average rate of fare. In January, 1922, the average rate of fare was 7.46 cents, in December it was 7.11 cents, and in April, 1923, it was 7.08 cents.

On this matter of fares it is pointed out that constant pressure has been put upon the electric railways to reduce their fares. It has, however, usually been a comparatively easy matter for the company to show that such reduction would be ruinous. In only a very few cases has there been any reduction in the cash rate, but some concessions have been made with respect to special fares.

As for the recent tendency toward increased cost of labor and of materials and supplies, their effect upon financial conditions of the industry will depend upon the amount of traffic carried during the summer months and for the rest of the year. As industrial activity and employment are very nearly at a maximum, it is reasonable to expect that the electric railways for the most part will operate at capacity and thus be able to hold their present position and perhaps even improve it somewhat.

Brooklyn City Railroad to Continue Independent Operation

The directors of the Brooklyn City Railroad have determined, according to an announcement made on July 7, that, in the interest of the stockholders, the property will remain independent of the reorganized Brooklyn-Manhattan Transit Corporation. In consequence expenditures have been authorized for betterments and improvements on the Brooklyn City surface system which will aggregate $5,000,000. The railroad is now carrying more than 21,000,000 passengers a month, an increase of 3,000,000 since the company began independent operation in October, 1919.

Special trackwork, involving the renewal of curves, switches and crossings, is being carried out, and fifty-four low-level center-entrance trailers are being equipped as motor cars. Seventy-five old type cars have been converted into "one-man two-man" cars at a cost of $175,000. In addition orders have been placed by the company for 200 four-motor passenger cars, referred to at length in the ELECTRIC RAILWAY JOURNAL for July 7, page 42.

Rebuilding of tracks was described as a chief task of the Brooklyn City management. Last year 12 miles of track and pavement were rebuilt and this year a further extensive track program is being executed.

It is of interest to recall that the "Brooklyn City Railroad" of today is the same company that was incorporated in 1853. It has never been through a receivership or reorganization and, in itself, has continuously been a profitable enterprise. It is now in an enviable position financially, a condition resulting largely from excellence of service.

Professor Ely to Direct Study of Credit Problem of Utilities

The Institute for Research in Land Economics and Public Utilities, with headquarters at the University of Wisconsin, announces in its first official publication, *Institute News*, that it has undertaken a study of public utilities to ascertain if the cost of their services cannot be reduced by a solution of their credit problem. The publication says:

> This study is entered upon for the purpose of discovering what is wrong with a public utility relationship which makes it necessary that these essential industries pay from 1 to 2 per cent more for their cheapest money, and up to 4 per cent more for their dearest money, than is paid by public corporations.
>
> Regulation should aim to eliminate risk and uncertainty from the investment of capital in these industries so that the rate of return would be comparable with that received from loans to public corporations.

As *Institute News* sees it public utility securities are gaining in favor with the investing public and the cost of money to public service companies is rapidly coming back to normal levels. As a basis for this statement it advances the results of a study of the relative borrowing power of public service corporations for the last twenty-five years, made by Herbert B. Dorau of the institute.

Establishment of the facts with regard to the cost of money to public service corporations is a preliminary step to an intensive study by the institute of the credit problem of regulated industries. Having determined the facts, the investigation will take the form of a detailed analysis of all the factors which make for the high cost of capital in these essential industries.

Richard T. Ely, professor of economics, is director of the institute.

City Would Allow Only $7,215,229 Value on Denver Tramway

The city of Denver on June 28 introduced at the tramway rate of fare hearing an appraisal of the city lines of the Denver Tramway of $7,215,229, based on an inventory of the lines made by Dr. Delos F. Wilcox. His figure is less than one-quarter of that named as the worth of the company by the experts for the company, who testified that the value ran from $31,000,000 to $35,000,000.

The inventory as presented by Mr. Wilcox does not include property of the company used in the city by its suburban lines, nor the track of the company from the city limits to Aurora, and to Englewood. Mr. Wilcox places no value on the company's franchise rights, street easements, or cost of financing the company.

In a preliminary statement, affixed to his report, Mr. Wilcox states that the method followed by him in making his inventory was that of estimating the value of the company on normal or historical reproduction cost. The basis of the company's top estimate was on the theory of reproduction new at the present time.

The total value of the company's city lines Mr. Wilcox placed at $12,051,260. This amount less accrued depreciation of $4,836,031, making $7,215,229 net, is taken as the figure upon which the company should, according to the city's contention, be allowed to make a profit.

Terms of Boston & Worcester Refinancing Announced

The plan for refinancing the Boston & Worcester Street Railway has been announced. It provides for the extension of $2,260,000 of first mortgage 4½s due Aug. 1, ten years at 6 per cent, the sale of $934,000 new common stock at par, the elimination of the holding company, which will offer all the common stock of the operating company to its own preferred shareholders, and waivers of arrears of preferred dividends by shareholders of the operating company. The floating debt of the railway will be paid off under the plan. Subscription to the new common stock has been underwritten.

Sale of Youngstown Interurbans Approved

Applications of the West End Traction Company and the East End Traction Company, Youngstown, Ohio, for authority to purchase interurban properties of the Ohio-Pennsylvania Electric Company have been approved by the Public Utilities Commission. The West End Traction Company asked for authorization of $582,700 of common stock and $1,345,500 of 7 per cent mortgage bonds to finance the purchase of the interurban line from Girard through Warren and Niles to Leavittsburg and Mineral Ridge, together with its branches. The commission found that a reasonable purchase and sale value is $1,317,500 and authorized issuance of $369,500 of stock and $948,000 of bonds.

The East End Traction Company asked to issue $165,994 of common stock and $360,000 of 7 per cent mortgage bonds for the purchase of the interurban line from East Youngstown to the state line at Lowellville, with its branches. The commission ruled $392,900 would be a reasonable purchase and sale value, and authorized issuance of $114,900 of stock and $278,000 of bonds.

The sale of the railway properties by the Pennsylvania-Ohio Electric Company is being made to carry out the company's policy of separating the ownership of the different kinds of utilities.

Auction Sales in New York.—At the public auction rooms in New York on July 11 there was sold $1,000 of United Traction Company (Albany) 4½ per cent bonds, due 2004; coupons June and December, 51 per cent.

Authorizes Certificate Issue.—The Public Service Railway, Newark, N. J., has been authorized by the State Board of Public Utility Commissioners to issue $400,000, par value, of equipment trust certificates. The issue is taken under an agreement of May 1 with the Fidelity Union Trust Company as trustee. The certificates bear interest at the rate of 6 per cent.

Approves Purchase.—The Dallas City Commission has given its final and official approval for the purchase by the Dallas Railway of the property of the Dallas Standard Traction Company, which built the railway in Mount Auburn and operated service for several years. The property and franchise of the Dallas Standard Traction Company were taken over by the Dallas Railway for $25,000.

$290,226 After Expenses in Fort Worth.—The Northern Texas Traction Company, Fort Worth, Tex., has filed with the city of Fort Worth its annual statement, showing earnings and operating costs. Gross earnings for the year were $3,029,724, and operating costs $2,639,498. Visible tangible property is valued at $3,565,140. The company has an authorized capitalization of $6,000,000.

Texas Railway Sold.—The Bryan-College Interurban Railway, which extends from Bryan, Tex., to the Agricultural and Mechanical College of Texas, at College Station, has been sold at auction for $40,000. The estate of S. S. Hunter, Shreveport, La., the largest bondholder in the original company, purchased the property. It is understood that the property will be junked and the track removed. The line has not been operated for some time.

Receiver for Minnesota Interurban.—Willard Hield and E. D. Luce have been named receivers of the Electric Short Line Railway, with terminals in Minneapolis, following the filing of a petition for receivership on behalf of the unsecured creditors. The company operates a total of 59 miles of road. E. D. Luce, one of the receivers, is vice-president of the company. Built originally as an electric line, the road some time ago went over to the use of steam as motive power.

$39,871 Loss in Youngstown in May.—The Street Railway Commissioner of Youngstown, Ohio, filed a report with the City Council on July 2 showing that the Youngstown Municipal Railway had lost $39,871 during May. The deficit in the stabilizing fund on June 1 was $929,928. Gross revenues for the month were $140,060 and the operating expenses were $95,592. A surplus of $10,605 was shown in the operating fund. Maintenance costs were $24,382 and a surplus of $7,653 was shown here. In May 2,448,795 passengers were carried and the earnings per car mile were 0.3255, while the cost was 0.3783.

New Quebec Issues Authorized. — Shareholders of the Quebec Public Service Corporation, subsidiary of the Shawinigan Water & Power Company, met on June 27 for the first time under the new corporate title of the Quebec Power Company. The capital is now $10,000,000, of which $4,000,000 is 7 per cent preferred. Power was given to issue first mortgage bonds up to the maximum of $20,000,000 to be issued in series as desired. No issue is contemplated immediately. The present issue of $2,600,000 preferred will rank *pari passu* with the $1,400,000 heretofore created. It is all part of a plan of refinancing.

Reorganization Plan Declared Operative.—The plan for the readjustment of the United Gas & Electric Corporation, New York, N. Y., through consolidation with the Berkshire Corporation has been declared operative. A special meeting of the stockholders of the United Gas & Electric Corporation will be held at the company's office at Hartford, on July 20, to approve the consolidation of the former with the Berkshire Corporation. The new corporation will be known as the United Gas & Electric Corporation. A review of the terms of the proposed plan of readjustment was published in the ELECTRIC RAILWAY JOURNAL for April 28, page 739.

Tidewater Southern Lost $14,882.—The Tidewater Southern Railway, operating in Stockton, Manteca, Ortega and Turlock, Cal., reports to the Railroad Commission for the year 1922 that its operating revenue was $217,731 and operating expenses $179,810, giving a net operating revenue of $37,920. Miscellaneous non-operating revenue was $3,183. Interest, rent, taxes and other deductions totaled $55,987. The net corporate loss for the year was $14,882. The deficit at the beginning of the year amounted to $249,821. Miscellaneous additions to surplus for 1922 amounted to $5,519 and miscellaneous deductions were $26,868, leaving an accumulated deficit at end of year of $286,052.

Traffic and Transportation

Electric Railway Comes to Shippers' Rescue

Owing to the abandonment of the Dayton, Toledo & Chicago Railway, which operated 105 miles out of Dayton, north to Delphos, Thomas J. Brennan manager of the Dayton, Covington & Piqua Traction Company, has completed plans whereby the traction company will take care of the different communities which were formerly served by this steam line.

The towns of West Milton, Pleasant Hill, Englewood, Union and Shiloh were practically put out of business last August, as far as getting their steam railroad shipments, consisting of grain, coal, stock, and other car load commodities. The Dayton, Covington & Piqua Traction Company came to the shipper's rescue, and has completed arrangements with the "Big Four" which operates through the town of Ludlow Falls, Ohio, for the interchange of equipment at Ludlow Falls. In turn the traction company will deliver the steam railroad cars to all points which were formerly served by the Dayton, Toledo & Chicago Railway.

To handle this freight business, it was necessary for the traction company to purchase certain sections of the Dayton, Toledo & Chicago tracks in the various towns along the line, building a connecting track with the "Big Four" at Ludlow Falls, also a connecting track in the above towns to be served, all of which have been completed.

The shippers and the general public in all of the communities have expressed their appreciation of the efforts put forth in having this service resumed, which will take the place of that formerly offered by the Dayton, Toledo & Chicago Railway, since that operation was suspended. In almost every instance it has been necessary to haul freight by motor truck many miles to the stations, with the result that business operations have been curtailed.

Los Angeles Traffic Report Filed

After visiting eight large Eastern cities for the purpose of adopting transit relief plans for the city of Los Angeles, Commissioner Bogardus and Chief Engineer Lorentz of the Los Angeles Board of Public Utilities have filed the final report of their findings and recommendations with the board. This report has been approved by the Board of Public Utilities and passed on to the City Council with the recommendations that detailed plans for subway systems and elevated lines in Los Angeles be undertaken at once. The report favored subways, elevated lines and surface lines with transfers to short-haul and motor bus feeder lines. The members of the board in their report declare the Pacific Electric Railway to be the logical system to supply the rapid transit service for the city. The report states:

> The proposed Hollywood tunnel or subway is the first unit toward giving this class of service to the northwest section of the city. The terminal change from the railway company's Hill Street terminal to Pershing Square is a move in the right direction, as ultimately Pershing Square should be the central point of all transportation systems either rapid transit or surface.
>
> A subway and depressed track should also radiate from Pershing Square in a southwesterly direction to Vineyard Junction, this arm to take care of the west beach district and afford loop service via Hollywood.
>
> The Pacific Electric's existing overhead viaduct east of Sixth Street terminal should be enlarged and extended easterly across the Los Angeles River and extending north to a private right-of-way, thus affording rapid transit to the northeast districts. The harbor and south coast beach districts should tie into this east and west overhead structure at Long Beach Avenue. Long Beach Avenue should either be elevated or depressed eventually, as far south as Slauson Avenue.
>
> The city should build all subways and elevated lines and lease them to the operating companies. In case the city should be unable to carry out this program and the companies are willing to undertake it, provision should be made for the city to take over such lines at its discretion and at a fair value.

As to the subway for the surface lines, it is recommended that it be built by the city and operated by the carrier engaged in that class of business on a rental basis. The board wants the surface lines unified.

The entire elimination of surface cars from the congested district of Los Angeles is a part of the proposed plan.

In the meantime the Pacific Electric Railway filed a request that it be allowed to start work at once on the proposed rapid transit subway having its terminal under Pershing Square. Ultimately, it is planned that Pershing Square will become the central terminal for subways in the city of Los Angeles, connecting remote sections and beach district rapid-transit lines.

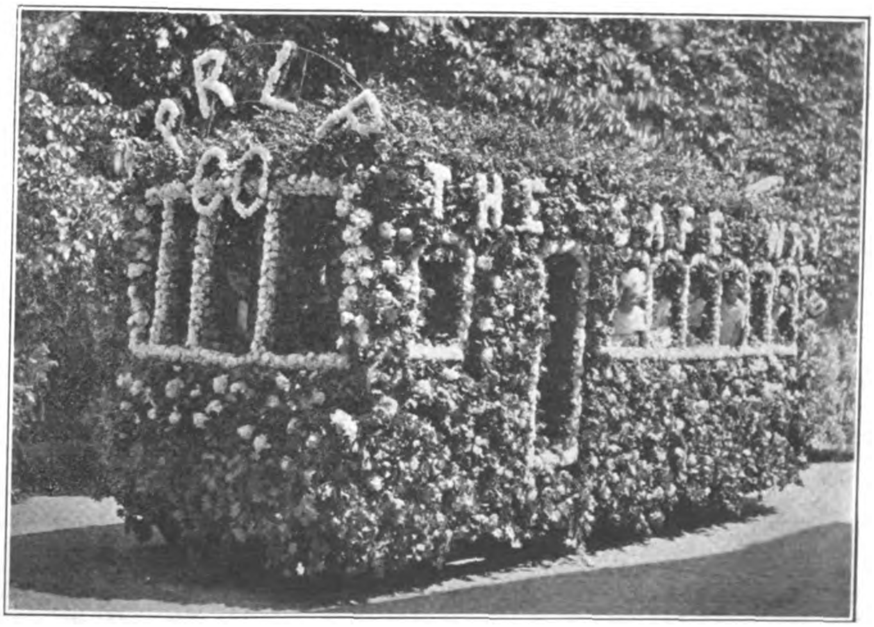
In view of the fact that the voters at the June 5 election sanctioned Pershing Square as the subway location, the railway now wants immediate action and ratification on the part of the various civic bodies of the city.

Railway Again Takes Part in Portland Rose Festival

The Portland Railway, Light & Power Company entered a "Safety First" floral float in the grand floral parade of the annual Rose Festival at Portland, Ore., June 12, 13 and 14, and won second prize in the public utility division. The float was designed to represent an actual street car and was loaded with sixteen young girls selected from the various schools, all dressed in white.

The Brooklyn school took a unique part in the famous "Rosebud (children's) parade" of the Rose Festival by entering a section devoted exclusively to "Safety First." All of the boys and girls were in uniform and bore safety first warnings on their backs and carried safety banners in the line of march. Some of the ingenious youngsters built a miniature ambulance and a miniature police patrol wagon which also took part in the procession. The accompanying photo shows the school children "at rest" during a halt of the parade.

The 250 "safety officers" of the Portland public schools were out in full force in the pageant and one of their picturesque stunts was the feeding of the 6,000 children in the parade with cookies, ice cream and milk. The feat was accomplished without halting the movement of the parade, groups of the safety officers being detailed to each of the marching divisions, handing out the goodies as the children swung by, amid the plaudits of the spectators.



Winner of Second Prize in Public Utility Division

Expert to Study Ford Works Traffic Problem

J. Rowland Bibbins, consulting engineer on transportation, has been called to Detroit to study the special traffic conditions of the northern part of that city, centering in Highland Park, the site of the Ford Motor Works. This situation has been growing in complexity along with the city itself, due to lack of adequate development of streets, transit lines, terminals, etc., combined with the rising flood of motor traffic, buses and de luxe jitneys. The Ford Motor Works employed 14,000 men in 1914, 31,000 in 1916 and 70,000 to-day, but practically the same street car lines and terminals exist today as during the pre-war period.

Mr. Bibbins will embody in his report to the City Council a broad consideration of streets, railroads, interurban development and special transit terminals as well as specific recommendation for immediate remedies in traffic control.

Louisville Celebrates Bus Opening —Movies Aid Introduction

Fifty-five representative business men of Louisville, on June 21, expressed their interest in the start of automobile coach service in the Kentucky city by the Kentucky Carriers, Inc., a subsidiary of the Louisville Railway, by going on an excursion to Speed, Ind., where they met the first arrivals of the new automobile coach fleet.

The six coaches which were met had been driven overland from Cleveland, where they were built. They furnished the means of transportation back to Louisville. The trip up to Speed was made on a special car of the Interstate Public Service Company.

James P. Barnes, president of the Louisville Railway and of the Kentucky Carriers, Inc., issued the invitations to the excursion. Among those who went on the trip were representatives of different departments of Louisville's municipal government, officials of the railway and of the coach company, bankers, industrial leaders, representatives of civic clubs and newspaper men. Lunch was served in the community house of the Louisville Cement Company at Speed.

After the journey back to Louisville had been made, the coaches were assembled and a parade staged through the downtown district. This ended at the City Hall, where Mayor Huston Quin, who had sent a personal representative on the excursion, congratulated the officials of the Louisville Railway for having developed an auxiliary and subsidiary coach service, predicting that this service would be successful and would mean much for Louisville's future.

Moving pictures were taken of the party and coaches at Speed and at different places along the road back to Louisville. These were shown before various luncheon clubs and in moving picture theaters the week after the excursion took place.

The plan for starting bus service in Louisville was reviewed in the ELECTRIC RAILWAY JOURNAL for June 2, page 944. As stated at that time the company contemplates using twenty-four buses. Of the twenty-four cars twelve will be single-deck vehicles and twelve double-deck. The single-deck buses have Bender bodies mounted on White chassis, while the double-deck buses will be supplied complete, chassis and body, by the Yellow Coach Company, Chicago. The statement was, therefore, incorrect which was made in the ELECTRIC RAILWAY JOURNAL for June 30 that the double-deck buses would be built on the White bus chassis using bodies of the Yellow Coach Company.

Receives Permission to Operate Bus Line

Orders have been received by the Tri-City Railway from the Illinois Commerce Commission allowing the company to discontinue service on the Third Avenue line from Forty-third Street, Rock Island, to Twenty-third Street, Moline. All passengers to Moline are to be handled on the Fourth Avenue line. With the above orders, a certificate of convenience and necessity was also received which is to allow the railway to operate a bus line on Twenty-third Avenue, Moline, from Sixteenth Street to Thirty-fourth Street. This line will act as an extension on the Fourth Avenue car line.

The order means a new system of travel under the Tri-City Railway in the three cities. The buses are to be built so as to accommodate twenty-five passengers and will go into service as soon as received. The bus fare will be the same as that on the railway and transfers will be exchanged between street cars and buses.

More Five-Cent Fare Lines.—The Boston Elevated Railway has established four more 5-cent fare lines.

Mutual Benefits from Safety.—According to a new plan which became effective on June 1 motormen and conductors of the Memphis Street Railway will receive one-half of all they can save the company on accidents based on their average cost for the past five years. This is part of the new "safety first" program.

New Color Popular in Sedalia.—The City Light & Traction Company of Sedalia has adopted a new color scheme for the nine cars that are being used in that city, and instead of the canary yellow that was used on cars they are being painted traction orange color, similar to the cars of Kansas City and St. Louis.

Jitney Measure Passed in Youngstown.—The Council of Youngstown, Ohio, has passed the so-called anti-jitney ordinance granting Safety Director Hamilton full power to regulate vehicular traffic in a congested district. The new measure provides that all traffic shall go directly through the square instead of around the curves on each side as at present.

Increased Rate Allowed.—The Fairburn & Atlanta Railway has received permission from the Georgia Public Service Commission to increase its passenger fare from 5 cents to 6 cents per zone. The company, which operates gasoline cars between College Park and Fairburn, claimed that it could not meet operating expenses at the lower rate.

Pass Abandoned.—After experimenting for three months, the Seattle & Rainier Valley Railway, Seattle, abandoned the weekly pass on July 2. According to company officials, the revenues have not been adequate to warrant carrying the experiment any further. The system was adopted by the company on April 2. The charge was $1.15 for a ticket good for a week.

Group Movement Speeds Traffic.—Movement of cars in the downtown section of Los Angeles has been facilitated considerably by the establishment of a plan for grouping cars between 7 a.m. and 6:15 p.m. The plan was proposed by Capt. James McDowell, head of the police traffic department, and was referred to in the ELECTRIC RAILWAY JOURNAL, issue of June 23.

Court Refuses Plea for Reduced Fare.—The 7-cent fare for Baltimore was declared legal by the Court of Appeals on June 26. The action in which the decision was rendered was to compel the United Railways & Electric Company to reduce its fare from 7 to 5 cents. The decision of the lower court which upheld the demurrer to the injunction against the 7-cent fare was sustained.

Arranging for Motor Traffic.—The City Commission has passed an ordinance authorizing the Memphis Street Railway to remove its tracks from Lauderdale Street between Linden and Vance Avenues. The action on the part of the commission is the first move to make Linden Avenue a thoroughfare for motor traffic. The company has agreed to reroute the Glenview cars on Vance instead of Linden, from Lauderdale to Third Streets. Later the tracks on Linden will be removed.

Commissioner's Finding Protested in Fare Case. — I. Edward Herrmann, Jerome T. Congelton and George L. Record, counsel respectively for the State Board of Public Utility Commissioners, the city of Newark and Jersey City, filed exceptions on June 29 in the United States Court to the report of Special Master Thomas G. Haight, who recommended that the rate of fare fixed by the Utility Board for the lines of the Public Service Railway be declared confiscatory and that a permanent injunction be issued to restrain the board from enforcing its order for a 7-cent fare, with 2 cents additional for a transfer. The fare allowed by the court over the protest of the commission is 8 cents cash or four tokens for 30 cents, with a 1-cent charge for a transfer.

Book Reviews

Railroads: Rates—Service—Management

By Homer B. Vanderblue, professor of business economics, Harvard University, and Kenneth F. Burgess, general attorney Chicago, Burlington & Quincy Railroad. The McMillan Company, New York, 1923. 488 pages.

Railroad regulation in the United States is accomplished by an elaborate system of governmental machinery. The purpose of this book, as stated by the authors, is to give information concerning that system, useful both to students and men of affairs, to the general public who desire to know the present methods of regulations, to students approaching an intensive study of railroad practices and to railroad officers whose duties have been restricted to limited fields.

The book is divided into four main parts: I, The Scope and Machinery of Regulation; II, Rates; III, Service, and IV, Management. These subjects have been treated from the standpoint of the transportation act of 1920 and the effect it has had on railroad operations. The treatment is distinctly from a legal standpoint, and references to court and commission decisions are made covering all of the main points.

Municipal Railways in the United States and Canada

Bulletin 18, Public Ownership League of America. Chicago, Ill., 1922.

This bulletin is a compilation of articles favoring municipal ownership of street railways gathered together from various sources. Following introductory articles by Delos F. Wilcox and Carl D. Thompson, several communities now having municipal ownership are described. The chapter on Detroit concludes with an article by J. S. Goodwin, late general manager of the municipal railway. San Francisco is covered by Jay G. Hayden and M. M. O'Shaughnessy, city engineer. The chapters on Toronto and Seattle are by Carl D. Thompson. Another chapter is devoted to seven small municipal street car lines in various parts of the country. Chapter VII on the Buffalo street car strike is by Mrs. Hiram W. Thomas. The concluding chapter "Labor Conditions Under Municipal Ownership" is by Carl D. Thompson.

In general, these articles review the various steps in the history of acquiring and operating municipal street railways in the United States and Canada. It is stated that there are now thirty cities in the United States and Canada that own and operate municipal railways, fifteen being in each country.

The purpose of the book is stated in the introductory chapter by Mr. Wilcox, as follows:

"The street car crisis is a crisis in public policy. Local regulations through franchise contracts and police power ordinances have failed. State regulations is a mere running away from the problem. Service-at-cost as a means of perpetuating the regime of private ownership and operation is a will o' the wisp. The crisis calls for one remedy and one only, and that is the full and frank acknowledgment of public responsibility for urban transportation service. Every American city needs a policy and a program looking to the complete municipalization of the street cars at the earliest possible moment."

Safety Education

A Plan Book for the Elementary School. By a committee appointed by the superintendent of schools, Chicago, Ill. Published by the Board of Education, Chicago, Ill.

As stated in the foreword, this book is a serious attempt at safety education in the elementary school through the regular subjects of the curriculum. It suggests accident prevention as at once a topic for study and as a motive for school activities. Experience in several other cities, and to a degree in Chicago, has shown that safety education in the schools has been the most effective agency in reducing the number of accidents to children.

The first ten chapters are for use during the ten months of the school session. They deal successively with these topics: Street dangers, fires, weapons, burns and scalds, poisons and asphyxiation, electrical safety, falls and falling objects, railway tracks and trains, accidents in play, drowning.

A general discussion of each topic is given, followed by slogans and jingles suitable for illustrations, and also statistics and their applications. Suggestions are given for graphic representation, dramatization and games relating to the subject, school organizations, rules and laws, projects for school and home and subjects for debate.

The remaining ten chapters form an appendix, covering the various methods of approach for the different subjects. Chapter XI, for instance, deals with slogans and jingles. A considerable amount of material is presented in this chapter, so that the teacher may be able to give this kind of instruction on each of the monthly subjects.

The book was prepared by a committee consisting of G. B. Masslich, D. F. O'Hearn, and G. L. Voorhees, under the supervision of Peter A. Mortenson, superintendent of schools. The National Safety Council and the Chicago Safety Council co-operated in the preparation of the book, and the manuscript was submitted for criticism to a list of some ninety persons. Street railway men included in this list were: W. H. Boyce, Beaver Valley Traction Company; M. W. Bridges, Chicago Elevated Railways; B. J. Mullaney, People's Gas Light & Coke Company, and John E. Wilkie, Chicago Surface Lines.

Atlas of U. S. A. Electric Power Industry

Outlining suggested regional electric power districts and proposed constant-potential transmission systems for the United States of North America. By Frank G. Baum, consulting hydro-electric engineer. McGraw-Hill Book Company, Inc., New York, N. Y.

In thirty-four charts and twenty-one pages of reading matter, the author condenses a great deal of information regarding the electric power industry and electric power transmission. In the first and second parts of the book, in addition to data on existing developments, the author suggests power districts and constant-potential transmission systems covering the entire United States. This is done with a view to utilization of all water power in the country. The third section consists of graphical statistics on natural resources, including fuels, precipitation, altitude of land, and forests.

Motor Transportation of Merchandise and Passengers

By Percival White. McGraw-Hill Book Company, Inc., New York, 1923. 486 pages.

The purpose of this volume, according to the author, is to combine and relate all phases of commercial highway transportation and to consider them in connection with other methods of transportation. The book is divided into twenty-seven chapters, dealing with various phases of the design, construction and classification of trucks and buses. A comparison of the different methods of drive for motor vehicles is discussed and the relative field of each is considered. The introduction of the bus into passenger transportation is taken up from its inception, and considerable space is given to showing its field in connection with other recognized means of passenger transportation. Advantages and disadvantages of buses as compared with trolley cars are frankly discussed.

The author's conclusions as to the future of the motor bus are that it lies mainly in two directions. The first is supplementary to existing systems of transportation, in which classification are included such applications as the Fifth Avenue bus lines, in New York, and those of the Chicago Motor Bus Company. The second application is complementary to existing systems, including such uses as extension and feeder services, as a means of helping suburbanites to reach the shopping center, or to form belt lines around congested districts, for filling in links in interurban systems, and where interurban traffic is not heavy enough to warrant a rail vehicle.

In his general conclusion, the writer warns against over-enthusiasm of some highway transportation advocates. He believes that motor-driven apparatus will be developed in harmony with the economic essentials, being used in its proper place in co-ordination with other methods of transportation.

Personal Items

Mr. Couzens Heads Canadian Association

New President Is Favorably Known as General Manager of Toronto's Municipal Railway System

At the concluding meeting of the Canadian Electric Railway Association, held on June 30 at Toronto, H. H. Couzens, general manager of the Toronto Transportation Commission, was elected president. Since Mr. Couzens assumed the duties of his present position, Sept. 1, 1921, Toronto's transportation system has been almost entirely rehabilitated. When the city took over the lines of the Toronto Railway the system was in exceedingly bad shape, the track being almost worn out and most of the cars being old. Under the leadership of Mr. Couzens the Transportation Commission at once began the work of rehabilitation, and at the present time the track has been reconstructed on all the principal streets and many new cars have been purchased. At the convention the commission had an exhibit of eighteen different types of cars in use in Toronto, showing everything from the newest and latest motor cars and trailers to an old train which was made up of a single-truck motor car with a single-truck trailer, both of which had served as horse cars. The surprising feature of the exhibit was that trains of this latter type were in use in Toronto when Mr. Couzens took charge, and the contract between the two illustrates the thoroughness with which he has done the work.

H. H. Couzens

Born in England in 1877, Mr. Couzens received his education at the Independent College at Taunton, England, after which he served as a pupil in mechanical and electrical engineering with Allen & Sons, Taunton, and the Taunton Corporation Electrical Works. After holding a number of engineering positions he became manager and engineer of the West Ham Corporation Electric Supplies in 1909, and three years later accepted a similar position with the Hampstead Borough Council. He held the latter position only one year, resigning at the end of 1912 to become general manager of the Toronto Hydro-Electric system, with which he took up his duties early in 1913. He continued in the latter position until the Toronto Transportation Commission took over the local street railway, when he assumed his present work.

Messrs. Dick and Willis Advanced at Atlanta

J. P. Dick, purchasing agent for the Georgia Railway & Power Company, Atlanta, and H. L. Willis, operating engineer for the company, have been appointed assistants to W. H. Taylor, vice-president of the company. F. A. Jordan, connected with the company the past eight years, has been named purchasing agent to succeed Mr. Dick.

Mr. Willis, who will operate as a special engineer under vice-president Taylor, is nationally known as an electrical engineer. He is also president of the Southern Appalachian Power Conference.

E. J. Dickson New Vice-President at Providence

The new vice-president of the United Electric Railways, Providence, R. I., E. J. Dickson, whose appointment was noted in the July 7 issue of the ELECTRIC RAILWAY JOURNAL, started in the transportation industry in 1887 with the Chicago, Burlington & Quincy Railway at Galesburg, Ill. As was noted in the ELECTRIC RAILWAY JOURNAL, issue of April 7, when his complete biography was given, Mr. Dickson's career has been marked by steady advancement from the lowest position to very nearly the highest. His biggest assignment came in 1913 when he became vice-president in charge of operation of the International Railway. His resignation from this position, effective May 1, of this year caused distinct regret among the Buffalo people.

Oregon Official Appointed to Ohio Interurban

The appointment of John W. Hewitt to be general superintendent of the Columbus, Newark & Zanesville traction lines, with headquarters in Zanesville, Ohio, was announced on July 12 at the headquarters of the company at Springfield, Ohio. The post was formerly handled by C. C. Fast, also general superintendent of the Indiana, Columbus & Eastern lines, but because of increasing duties it was deemed desirable to separate the two positions. Mr. Fast continues in his present post with the Indiana, Columbus & Eastern Traction Company. Mr. Hewitt was formerly with the Sumpter Valley Railroad, a steam line in southern Oregon.

From Boston to Baltimore

H. B. Potter, Well Known New England Official, to Assist Mr. Emmons in Southern City

H. Bertram Potter, one of the most popular electric railway officials in Boston, has resigned as assistant general manager of the Boston Elevated Railway to become assistant to the president of the United Railways & Electric Company, Baltimore, Md.

In the formulation of street railway legislation in Massachusetts Mr. Potter has been of great assistance, having attended the legislative hearings at the State House and the hearings of the Public Utilities Department for many years. On many of these occasions he has been the spokesman for the Boston Elevated, but his interests extended beyond the limits of his own company.

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H. B. Potter

Mr. Potter went to Boston about thirteen years ago from Maine, where he had been identified with the building and operation of electric railways. His early connection with the Boston Elevated was as assistant to Matthew C. Brush during the eight years that the latter was first vice-president and then president of the company. When the Boston Elevated was turned over to a Board of Public Trustees, with Edward Dana as general manager, Mr. Potter became assistant general manager.

During the intensive campaign for safer operation of electric railways and vehicular traffic Mr. Potter became one of the organizers of the Massachusetts Safety Council, in which he gave much time to the prevention of accidents. He is chairman of the accident prevention committee of the American Electric Railway Transportation & Traffic Association and vice-chairman of the trackless transportation committee of the American Electric Railway Association. He has made a special study of motor bus development. He is also a member of the New England Street Railway Club.

Mr. Shryock Made Manager Youngstown & Suburban Line

E. O. Shryock, manager of the Zanesville properties of the Columbus, Newark & Zanesville Railway, has been appointed manager of the Youngstown & Suburban Railway. He is succeeded in his former position by Ricardo Z. Zimmermann.

Mr. Shryock has been manager in Zanesville since August, 1922. His transfer to the Youngstown property comes as a well-deserved promotion. Prior to his coming to Zanesville he had had considerable experience with lighting, power and railway companies in a number of cities in Pennsylvania and Ohio. He started his business career in June, 1906, when he entered the employ of the Meadville Traction Company, the Meadville & Cambridge Springs Street Railway and the Peoples Incandescent Light Company, a jointly operated railway and lighting property in Meadville, Pa. In February, 1909, he was made superintendent of a new division which was operated under the name of the Meadville & Conneaut Lake Traction Company. Four years later a consolidation of the above companies was effected under the name of the Northwestern Pennsylvania Railway & Electric Service Company and Mr. Shryock was made general superintendent and purchasing agent of the combined properties. In May, 1920, he resigned to become superintendent of railways of the Northwestern Ohio Railway & Power Company with headquarters at Oak Harbor, Ohio, leaving this position in June, 1922, to accept appointment as superintendent of transportation with the Columbus, Newark & Zanesville Electric Railway. A few months later he was made manager of the company's activities in Zanesville upon the resignation of B. S. Waters. Mr. Shryock was prominently identified with the civic affairs of Zanesville, being a member of the Chamber of Commerce and Rotary Club.

Ellis and Way Elected Officers of the Wisconsin Company

A. K. Ellis, for many years secretary, treasurer and general superintendent of the Wisconsin Traction, Light, Heat & Power Company, Milwaukee, Wis., has been elected general manager and secretary and treasurer of that company, the property of which was recently purchased by the North American Company, New York.

S. B. Way, vice-president and general manager of the Milwaukee Electric Railway & Light Company, has been elected vice-president and a director of the Wisconsin Traction, Light, Heat & Power Company.

Dr. H. M. Blain, head of the department of journalism of Tulane University, New Orleans, La., has been named director of the newly organized Louisiana-Mississippi Committee on Public Utility Information. In addition to his teaching work Mr. Blain is experienced in both newspaper work and advertising.

Mr. Gordon on "Journal" Staff

Charles Gordon, equipment engineer of the Chicago Surface Lines, has joined the staff of ELECTRIC RAILWAY JOURNAL as Western editor, this position having been vacant since H. L. Brown was transferred to the New York office, though the JOURNAL has meantime had representation in the central territory through D. F. Hine, and more recently M. B. Knox, who continues as assistant editor in Chicago. Mr. Gordon will be located in the Chicago office.

As Mr. Gordon is considered quite generally to be one of the most competent young engineers in the country in point of car and equipment design and maintenance, he brings to the JOURNAL an invaluable practical experience that should be of particular service to the readers at this time, in view of the present great activity in this phase of railway work. He has had direct charge of the many engineering problems worked out in the last few years, under the direction of H. H. Adams, by the rolling stock department of the Chicago Surface Lines, in developing the several new types of cars and new mechanisms and original construction details that have frequently been the subject of articles in this paper.

Charles Gordon

Mr. Gordon was graduated from the University of Illinois, railway electrical engineering department, in 1912. His first position was with the Chicago Railways Company, where he was engaged in various electrical and mechanical test work under the direction of John Z. Murphy, then chief engineer. He remained with the company until December, 1917, when he entered the United States Army air service as engineer officer of the 276th Aero Squadron. On his discharge from the military service in April, 1919, he was employed in the sales and service department of the Vacuum Oil Company until his appointment in November, 1920, as equipment engineer of the Chicago Surface Lines.

Mr. Gordon is a member of the equipment committee of the American Electric Railway Engineering Association and an aggressive proponent of the advantages of uniformity and standardization, particularly as applied to the various equipment of the individual property.

Former B. R. T. Directors Not on Board of Successor Company

The personnel of the board of directors of the Brooklyn-Manhattan Transit Corporation is in sharp contrast to that of the Brooklyn Rapid Transit Company, of which the new company is the successor. It will be remembered that the old company was dominated by the so-called Brady interests. These interests are apparently not even represented indirectly on the board of the successor company. As previously noted in the ELECTRIC RAILWAY JOURNAL on the new board are: Arthur S. Somers, James H. Post, James Sherlock Davis, Charles A. Boody, William H. English and William H. Johns. These are the company's own representatives, though the official "public representatives" have been named by the Transit Commission—Travis H. Whitney, Robert Alfred Shaw and Alfred E. Marling.

Not only was Arthur S. Somers, president of the Brooklyn Chamber of Commerce, at the head of the list of directors given out after the election, but he was also made a member of the executive committee of the board of directors. Following is the executive committee: Gerhard M. Dahl, chairman; Albert H. Wiggin, Arthur S. Somers, Frederick Strauss, Matthew C. Brush and Charles S. Sargeant.

Naturally a great deal of interest has attached to the personnel of the board of the new company. Biographies of Mr. Dahl and of W. S. Menden, president, have already been published in these pages. All of the men on the board with possibly one or two exceptions are known nationally in business or financial circles. Perhaps the most prominent local man on the board is Mr. Somers. Of the other members of the board Matthew C. Brush is undoubtedly best known among electric railway men. He was formerly president of the Boston Elevated Railway. He is also a member of the executive committee of the new company. Mr. Menden, the president, is in full charge of operation. Whether or not the scheme of organization contemplates the designation of the title of general manager has not been announced.

W. C. Markham Joins Construction Company

William C. Markham, construction engineer for the Detroit Department of Street Railways, has resigned to become affiliated with the W. C. Markham Construction Company, of which he will be treasurer and general manager. General construction work and home building will be undertaken by the new company.

Mr. Markham was the first employee of the municipal street railway department when it was organized in 1920. During his employment by the city he has supervised the construction of all railway lines as well as the new city garage for the city motor department, the largest building of its kind in the country. As engineer he also prepared the plans for subway dips which were submitted to the Rapid Transit Commission by the street railway department.

R. Z. Zimmermann Succeeds Shryock in Zanesville

Ricardo Z. Zimmermann has been appointed manager of the Columbus, Newark & Zanesville Traction Company at Zanesville, Ohio, to succeed E. O. Shryock, recently promoted manager of the Youngstown & Suburban Railway.

Mr. Zimmermann has had wide experience in public utility work. Born in Buenos Aires, Argentina, where he lived for several years, he received his collegiate training in the college of engineering, University of Pennsylvania. He was graduated from that institution with the class of 1916 after having spent his vacation periods in utility work. After leaving college, he became connected with Day & Zimmermann of Philadelphia, management engineers.

His first work for that company was being placed in charge of the field office at Erie, Pa., where the concern was constructing a 16,000-kw. generating plant for the Erie Lighting Company.

Completing the work at Erie, Mr. Zimmermann went to Greenwich Point, near Philadelphia, where he assumed charge of the field forces constructing several immense piers and warehouses for the United States army quartermaster's department. He later entered the management division of the Day & Zimmermann company as commercial and rate engineer and later was transferred to the division handling public utility reports and investigations. In March, 1922, he was sent to Salem, Ohio, as manager of the Salem Lighting Company, which serves a number of towns in addition to Salem. This position he held up to his recent promotion as manager of the traction properties in the city of Zanesville.

Percy H. Whiting, manager of the securities department of the Central Maine Power Company, has been appointed manager of the customer-ownership division of the securities department of Henry L. Doherty & Company, with headquarters at New York. Mr. Whiting has made a brilliant reputation for himself as a pioneer Eastern developer of the customer-ownership idea in utilities circles, and aside from his effective direction of various campaigns for the Central Maine Company during the past few years, has frequently been retained as a consultant by central-station companies on this class of work.

James H. Drew with Ohio Brass

James H. Drew has been appointed manager of the line material division of the Ohio Brass Company, Mansfield, Ohio.

Mr. Drew was one of the founders of the Indianapolis Brass Company, which started the manufacture of electric railway line material in 1906. In 1913 he bought the railway business of the Indianapolis Brass Company and formed the Drew Electric & Manufacturing Company of Indianapolis, Ind., and later of Cleveland. Of this latter company he served as president until July 1 of the present year. During the past two and one-half years Mr. Drew has been associated with Arthur G. McGee & Company, Cleveland, who took over the management of the Drew Electric & Manufacturing Company in the early part of 1921.

Mr. Drew will direct the development, engineering and sales of the line material division of the Ohio Brass Company.

J. H. Drew

Mr. Drew is widely known among electric railway men over the country, but has been particularly popular and active in the Central States. He is a regular attendant at association meetings, and has played no small part in making the meetings of the Central Electric Railway Association successful and pleasant.

P. H. Mulcahy, the new general manager of the Utah-Idaho Central and the Utah Rapid Transit Company, has been auditor and assistant manager of the above-mentioned properties since 1917. Prior to that time he spent three years with the Wells Fargo Express Company, and was also associated with the Southern Pacific Company in various capacities. Mr. Mulcahy steps up into the position made vacant by William A. Whitney, who has been made active head of the Mount Hood & Sumpter Valley Railroad in Oregon, as well as manager in charge of operation of the Oregon Lumber Company mills in Oregon and Washington. He, however, will remain with the two Utah electric railroads as vice-president and director. Mention of Mr. Whitney's change and the subsequent promotion for Mr. Mulcahy was made in the ELECTRIC RAILWAY JOURNAL for June 16.

Obituary

E. H. Eckert

Edgar Hampton Eckert, formerly associated with the Toledo Railways & Light Company as legal representative, died recently in Toledo. Mr. Eckert was born in Maumee. He was educated in Toledo and Maumee schools and was graduated from the law school of the University of Michigan. In the early years of the franchise controversy between the city of Toledo and the Toledo Railways & Light Company, prior to the entrance of Henry L. Doherty into Toledo, Mr. Eckert was one of the leaders in trying to obtain a franchise for his company. When the old Everett-Moore syndicate disposed of its interests to Henry L. Doherty. Mr. Eckert severed his connection with the company and eight years ago went to New York. He had been an invalid for the past five years.

F. W. Little

Francis W. Little, who promoted the predecessor of the Springfield Light & Traction Company, Springfield, Mo., died recently at his home in Minneapolis. Mr. Little had greater influence in the development of Springfield than has been generally recognized. He was the first man to bring the matter of water power development to a definite head in the Springfield region by having a survey made of the entire region and exhaustive investigation conducted on every source of supply. Largely as a result of this work the water power development of White River in the Ozark section took place.

Mr. Little headed a company that bought the local lighting plant at Springfield from E. Henning in 1903. He modernized the equipment and made many improvements. In 1906 he and George Macomber of Maine bought the street railway system and consolidated it with the lighting plant. He sold out his interests in Springfield in 1911 to the Federal Light & Traction Company.

He was a lawyer by profession, but had never practiced, giving his time over to the promotion of public utilities and particularly electric street railway systems. Even before the work which he did in Springfield Mr. Little was interested in the railway and other public utilities in Lincoln, Neb. One of his closest associates was John R. Walsh, the Chicago financier.

Frank L. Henry, formerly electrical engineer of the St. Joseph Railway, Light, Heat & Power Company, was killed recently in a coal mine accident at Los Cerillis, N. M., and the body was taken to St. Joseph for burial. He left St. Joseph about a year ago to engage in electrical engineering work in New Mexico.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Western Cedar in Demand for Poles

Supply of Eastern Cedars Is Being Rapidly Exhausted—Bark Disease Has Killed Many Chestnuts

The annual demand in the United States for poles of various kinds is more than 4,000,000. Ninety per cent of these are supplied by three species: Cedar, chestnut and pine. According to the Forest Service of the U. S. Department of Agriculture, sixty per cent of the pole supply has heretofore come from the various species of cedar. Chestnut and pine have supplied about 30 per cent more, the remaining 10 per cent coming from cypress, oak, spruce, tamarack, redwood and others.

PAST SOURCES OF SUPPLY MUCH DEPLETED

Of the cedars, the Northern white, Western red, Southern white and Southern red cedars have been the most important. The supply of all the Eastern cedars is being depleted quite rapidly. In the Lake states the heavy operations in pine are practically a thing of the past and cedars, hemlock and the hardwoods are now the principal species cut. It is not expected, therefore, that Eastern cedar will long remain on the pole market.

Chestnut throughout the East has been one of the chief sources for poles. The end of this supply also is practically in sight because of the ravages of the chestnut bark disease, which is spreading throughout the range of chestnut and is killing practically all of the trees it attacks. Timber killed by this disease is entirely suitable for poles or other uses, but since there is no renewal the exhaustion of the present stands will virtually mean the end of chestnut timber.

Longleaf pine and the other pines of the South have been very abundant on the market for many years. But the drain on the supply of these species has been so heavy that it is predicted that within ten or fifteen years the stands of saw timber will be depleted to a stage where lumber operations in the South will be at a low ebb. While there will be some pole timber left after the stands of saw timber have been cut, the better poles, everything considered are those cut from mature trees. It is probable that an inferior class of poles can be depended upon from the Southern pines for quite a long time.

Western red cedar, which occurs chiefly in northwestern Montana, northern Idaho, Oregon, Washington and British Columbia, is an admirable pole timber. The supply is very extensive. Many virgin stands of it have not yet been exploited. Western red cedar has been increasing in importance for a number of years largely due to the depletion of the Eastern pole timbers near the heavy consuming markets. The demand for red cedar poles is beginning to have its influence in the rapidly increasing stumpage prices for desirable pole timber. It is probable that for many years this species will be the chief source of supply for the larger transmission poles.

Other pole possibilities are the Douglas fir of the Northwest, California redwood, lodgepole pine of the Rocky Mountain region, jack pine of the Lake States and, to a less extent, Western yellow pine. Douglas fir is an excellent pole tree, but it is quite heavy and has the additional disadvantage of being at a great distance from the heavy consuming centers of the eastern part of the country.

California redwood makes a good durable pole, but it is necessary that poles from this species be sawed. The expense of this operation together with heavy transportation charges to the East coast will prevent its active competition with cedar of the northeast.

Lodgepole pine occurs in great abundance through the northern Rockies. This tree, although of good pole form, is small in diameter and height and non-durable. For rural lines and the places where small poles will suffice, no doubt this species will be of increasing importance in the future. The jack pine of the Lake States is very similar to lodgepole, although of the two the lodgepole is the better pole timber.

Western yellow pine, a tree occurring over a wide range in the western part of the country, will supply an inferior class of poles. In comparison with cedar this wood is non-durable and also in other respects it is far from being as desirable as the Western red cedar.

There are several other species of trees which are used locally for poles, and no doubt these will become increasingly important in the future. They are tamarack, Western larch, Western hemlock, the white firs and spruces. Preservative treatment will, of course, be required for best service with such species.

Laconia Car Company Is Busy

The recent order of cars for the Boston Elevated Railway and repair orders for the Boston & Maine Railroad are keeping the Laconia Car Company busy. The earnings for the first seven months of the fiscal year to May 1, after deducting interest and charges, are said to have amounted to more than the earnings for the full 1922 fiscal year. This is explained in part, however, by the fact that the plant was closed for three months during 1922.

Zinc Industry on Up-Grade

The year 1921 and the first part of 1922 witnessed the lowest gross output of zinc in this country since 1879. Increased prices for zinc and lead in the last few months of 1922, however, helped the mines to make a modest recovery, and the production and development during the first six months of 1923 promises a very considerable increase for this year. The industry appears to be approaching the condition of the more prosperous years from 1912 to 1918. Some of the mines that were developing during the period of low zinc prices from 1919 to 1922 have been able to respond quickly to the increased price. Many mines temporarily shut down are again active, and improvements and additional machinery are being installed in several places.

Bituminous Production Gains

Although the rate of soft coal production continued steadily downward for four consecutive weeks, the fifth week, ended June 30, showed a slight increase. The total output for that week was 10,609,000 net tons, against a revised figure for the preceding week of 10,422,000 tons. The average daily rate of production is now slightly above the low rate during mid-April. The total production during the first 154 working days in 1923 was 273,423,000 net tons. This is slightly less than in 1917 and 1918, years of great activity, and slightly more than in the year 1920, which is also classed as a year of activity. It is greatly in excess of the production in the years 1919, 1921 and 1922, years of depression. The production for this year to date is slightly in excess of the average for the three years of industrial activity already mentioned, and greatly ahead of the average for the years of depression. In spite of the four consecutive weeks in which the rate of production per working day decreased, however, there seems little reason for apprehension at the present time.

Metal, Coal and Material Prices

Metals—New York	July 10
Copper, electrolytic, cents per lb	14 437
Copper wire base, cents per lb	17 25
Lead, cents per lb	6 05
Zinc, cents per lb	6 43
Tin, Straits, cents per lb	38.25
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$5 375
Somerset mine run, Boston, net tons	2.50
Pittsburgh mine run, Pittsburgh, net tons	1.95
Franklin, Ill., screenings, Chicago, net tons	1 675
Central, Ill., screenings, Chicago, net tons	1.375
Kansas screenings, Kansas City, net tons	2.625
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$7.45
Weatherproof wire base, N. Y., cents per lb.	18.50
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N. Y., per gal	$1.08
White lead, in oil (100-lb. keg), N. Y., cents per lb	11.85
Turpentine, (bbl. lots), N.Y., per gal	$.94

Rolling Stock

Birmingham Railway, Light & Power Company will install motors on five trailers. The motors are expected within ninety days. The trailers must be remodeled to some extent to serve as motor cars.

New Haven & Shore Line Railway, New Haven, Conn., has ordered six passenger cars of the semi-convertible type, 13 tons weight, for early delivery from the J. G. Brill Company's Wason car shops at Springfield.

Dallas Railway may be in the market for thirty additional cars as a result of suggestions by John W. Everman, supervisor of public utilities, in his recommendations that the 6-cent fare be continued.

Eastern Texas Electric Company, Beaumont, Tex., has placed an order with the American Car Company for seven double-truck safety cars to be delivered in September. The specifications of these cars follow:

Seating capacity	45
Total weight	26,000 lb.
Length over all	40 ft., 1 in.
Truck wheelbase	5 ft. 1½ in.
Width over all	8 ft. 5 in.
Height, rail to trolley base	12 ft. 5 in.
Body	Semi-steel
Interior trim	Mahogany
Roof	Arch
Airbrakes	Westinghouse, 100% Control
Armature bearings	Ball
Car signal system	Faraday
Control	G. E., K-35
Destination signs	Hunter
Door-operating mechanism,	Safety Car Devices Company
Fare boxes	Johnson
Wheelguards	H. B. Life Guards
Gears and pinions	G. E.
Hand brakes	Peacock staffless
Heater equipment	None
Headlights	Golden Glow, SM-95
Journal bearings	Friction
Journal boxes	Brill
Motors, type and number	Four G. E. 258
Motors	Inside hung
Seats	Brill Waylo Special
Seating material	Rattan
Slack adjuster,	American Brake Co., Type U
Trolley catchers or retrievers,	Ohio Brass Company
Trolley base	Ohio Brass Company
Trolley wheels or shoe	Wheels
Trucks	Brill 77-E.
Wheels	26 in., rolled steel
Special devices, etc	Bennett roll screens, door selector mechanism, air-operating fare box.

Eastern Wisconsin Electric Company, Sheboygan, Wis., recently received five new cars from the St. Louis Car Company, the order for which was placed several months ago. The detailed specifications of these cars follow:

Type of car	Light-weight
Seating capacity	44
Total weight	36,760 lb.
Bolster centers, length	5 ft. 2 in.
Length over all	43 ft.
Truck wheelbase	5 ft. 4 in.
Width over all	8 ft. 9½ in.
Height, rail to trolley base	12 ft.
Body	Steel
Interior trim	Birch
Headlining	Agasote
Roof	Arch
Air brakes	General Electric
Armature bearings	Sleeve
Axles	Forged open hearth steel 5 in.
Bumpers	Steel
Car signal system	Faraday
Car trimmings	Bronze
Center and side bearings	Ball bearing
Conduits and junction boxes	Loom
Control	G. E. K-35
Couplers	Standard radial drawbar
Curtain fixtures	Curtain Supply No. 90
Curtain material	Pantasote
Destination signs	Hunter
Door operating mechanism	General Electric
Fare boxes	Wood
Fenders or wheelguards	Pilot
Gears and pinions	General Electric
Handbrakes	Peacock staffless
Heater equipment	Consolidated and Peter Smith
Headlights	Golden Glow
Journal bearings	3¾ in. x 7 in. M.C.B.
Journal boxes	St. Louis Car Company No. 10912
Lightning arresters	General Electric
Motors	G. E. 265-A
Motors	Inside hung
Paint, varnish or enamel	Sherwin Williams
Registers	Ohmer
Sanders	St. Louis Car Company
Sash fixtures	O. M. Edwards
Seats	St. Louis Car Company
Seating material:	
Coach	Green plush
Smoker	Pantasote
Slack adjuster	Turnbuckle No. 12247
Springs	Railway Steel Spring Company
Step treads	Feralun
Trolley retrievers	Earl No. 5
Trolley base	Ohio Brass
Trolley wheels	5 in.
Trucks	St. Louis Car Company Commonwealth pedestal type
Ventilators	Peerless
Wheels	26-in. Standard Wheel Works ¾ in. x 1 in. flange 2½ rim

Track and Roadway

Duluth Street Railway is constructing an extension which will mean an addition to its system of 1.66 miles of single track.

Los Angeles Railway has started double tracking West Seventh Street between Hoover and Vermont. The work involves half a mile of double-track construction and will be completed within two months.

Trenton & Mercer County Traction Corporation, will relocate 4,500 ft. of track through Lawrenceville, N. J., and place the track in the center of the road. The company will also lay new rails and ties over the same route at a cost of $15,000.

United Electric Railways, Providence, R. I., has been granted permission to install passing tracks and crossovers in North Main Street. A new curve will be installed at Dorrance and Westminster Streets, and the track will be relocated at Massasoit and Waterman Avenues, East Providence.

Power Houses, Shops and Buildings

Western Ohio Railway, Lima, Ohio, has received a turbine generator of 2,000 kw. capacity, to act as a secondary unit to a turbine of 4,000 kw.

Wisconsin Public Service Corporation, Green Bay, Wis., plans to increase the output of its hydro-electric plant on the Menominee River with the installation of a vertical 3,000-hp. turbine.

Eastern Texas Electric Company, Beaumont, Tex., during the next four months will make the following improvements: Will build an addition to present office building; 33,000-volt power line, Port Arthur to Beaumont; fuel oil storage tank, 55,000 bbl.; switchboard bay at Port Arthur station and will reconstruct present meter storeroom and line department building.

Trade Notes

Reginald M. Campbell, who was appointed last year special representative of the American Copper Products Company with headquarters in New York City, recently resigned. For eight years previous to his association with the American Copper Products Company Mr. Campbell was identified with the Habirshaw Electric Cable Company, which he joined when he severed his connection with the Ohio Brass Company. He is well known in electric light and electric railway circles and also in the steam railroad field. Mr. Campbell is a member of the New England Street Railway Club and the Railroad Club and Engineers' Club of New York. His present address is Engineers' Club in New York.

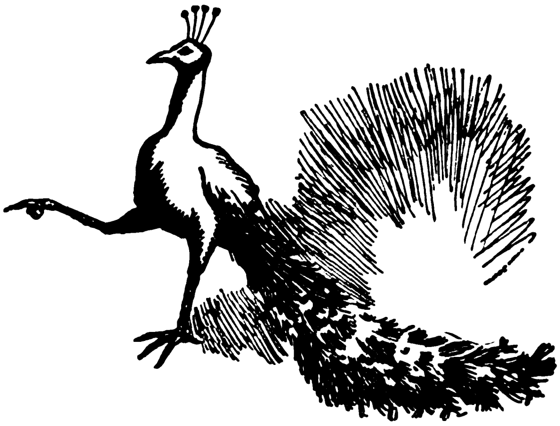
National Pneumatic Company, New York, N. Y., announces the appointment of J. H. VanderVeer as sales engineer, with headquarters at Rahway, New Jersey. Mr. VanderVeer is well known by electric railway men through his work for the rapid transit and surface lines in New York and for Stone & Webster. He started in as an office boy in the legal department of the Brooklyn Rapid Transit Company and later worked up to the position of sub-foreman of inspection at the Coney Island elevated terminals. He resigned this position to take a course in Stevens Technical Institute in mechanical engineering and after graduation entered the management division of Stone & Webster, for which firm he was engaged on railway engineering and maintenance work for the Chicago Elevated Lines and for companies in Georgia, Florida and Louisiana. During the war Mr. VanderVeer was sent to Cuba by Stone & Webster to manage a small electric light and water property. Returning to the United States, he became master mechanic of the Annapolis Short Line. Next he was engaged for Stone & Webster upon appraisals of railway properties in New York, Brooklyn, Richmond, and other cities. From Stone & Webster Mr. VanderVeer went to the position of assistant superintendent of equipment of the Third Avenue Railway System under J. S. McWhirter, leaving there after more than two years service to join the National Pneumatic Company.

New Advertising Literature

Electric Service Supplies Company, Philadelphia, Pa., has issued a new 688-page catalog on car equipment and supplies, which undoubtedly is the most complete catalog of its kind. It contains elaborate wiring diagrams, tables and other useful information, including extensive listings of Golden Glow headlights, Keystone-Hunter destination signs, Keystone gear cases, Faraday signals and the various other Keystone car specialties, including the usual car supplies and carhouse shop equipment.

The Reparations Problem

Today, statesmen all over the World are most gravely concerned with the tremendous international problem of *paying the costs of the catastrophe which shook the World from* 1914 *to* 1919.



It's cheaper to prevent the damage in the first place than to dispute about the "damages" afterward

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are designed to *prevent* accidents

Railway problems are not so very different from World problems in this respect. Regardless of who is at fault, accidents mean claims and counter claims, lawsuits, settlements, criticism and trouble generally. It pays to take every possible precaution against having the accident in the first place.

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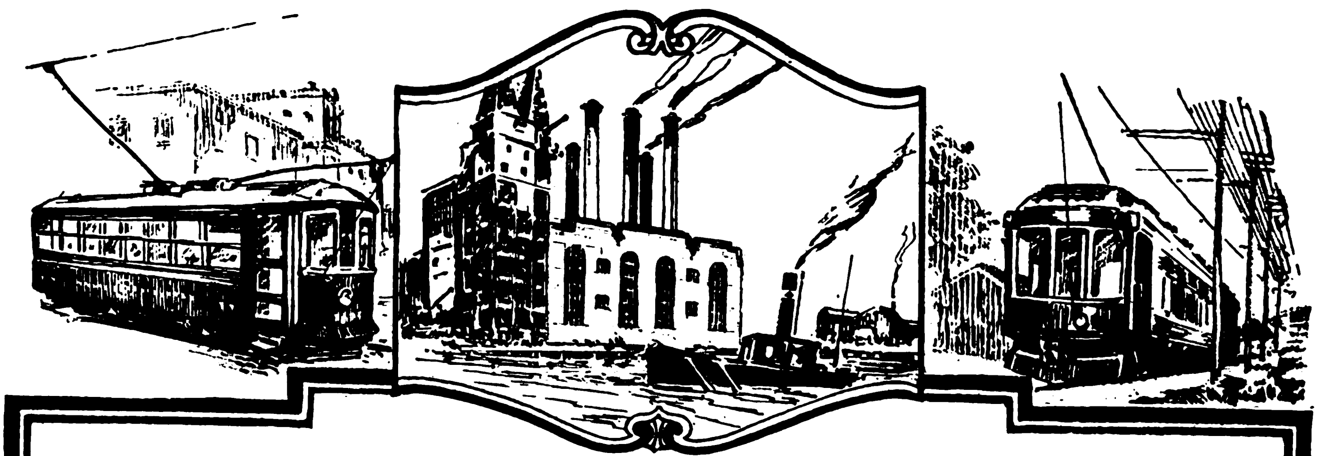

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On many roads, throughout the United States, shrieking, grinding curves are no more.

These roads have adopted a means of reducing the friction between the rails and the wheel flanges.

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Texaco Curve Grease is a product especially prepared for the purpose. It adheres to the track grooves; it stays where it is put; is not squeezed out by the side pressure; nor will it climb the rail head.

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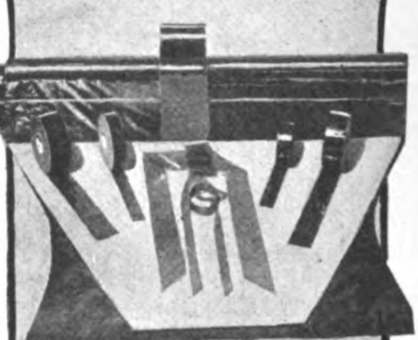

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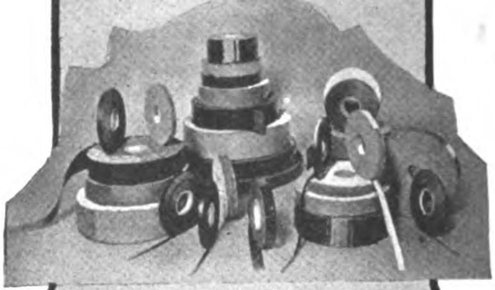
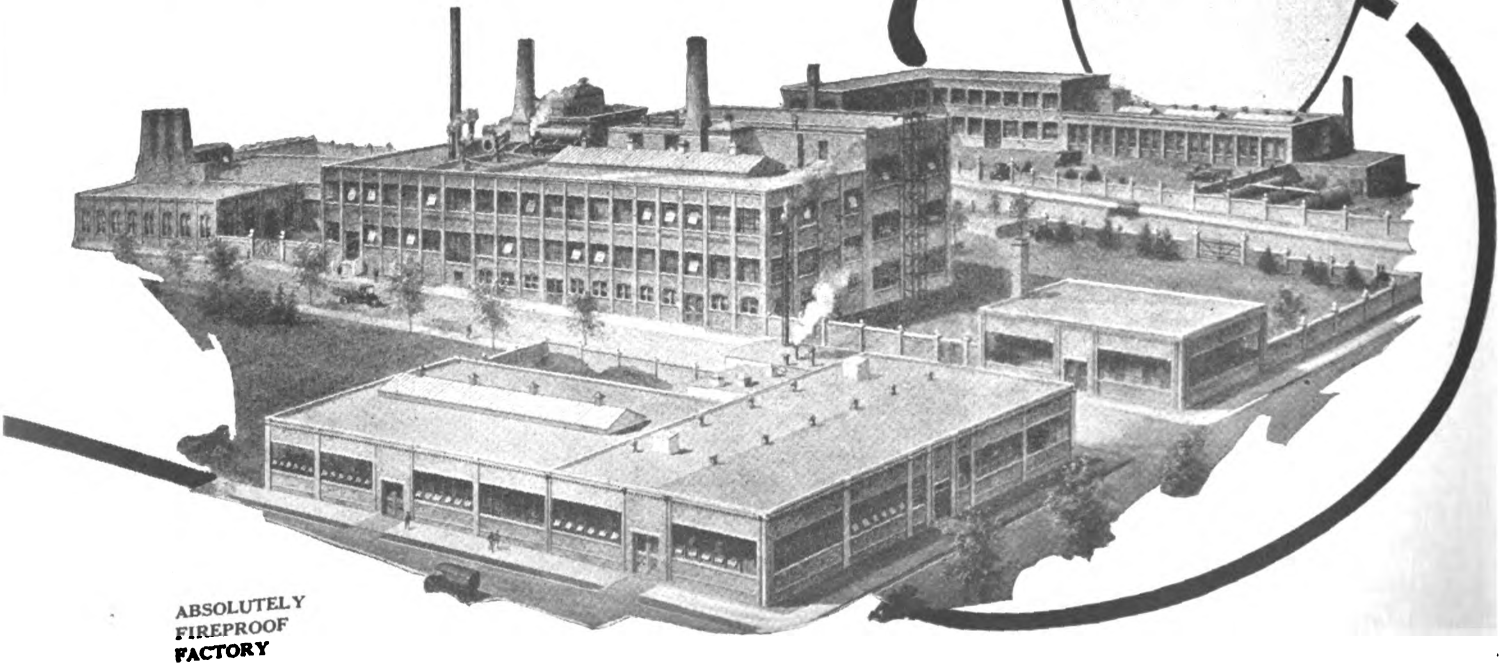


Varnished Cambric tape—black and yellow.



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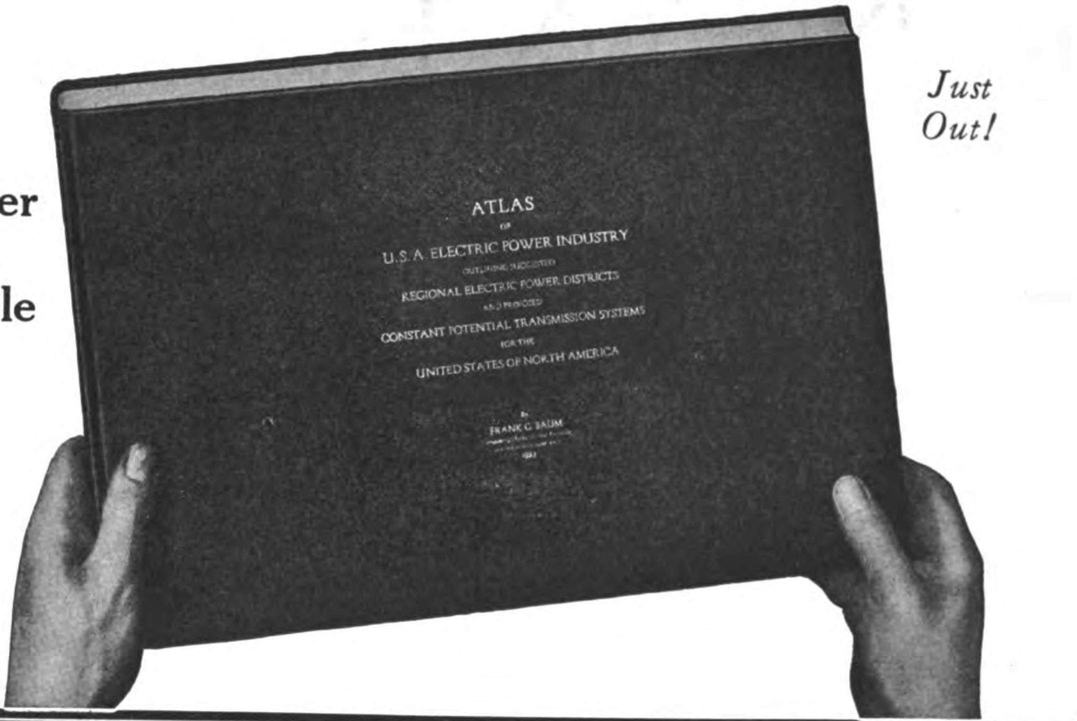
ATLAS
OF
U.S.A. ELECTRIC POWER INDUSTRY
OUTLINING SUGGESTED
REGIONAL ELECTRIC POWER DISTRICTS
AND PROPOSED
CONSTANT POTENTIAL TRANSMISSION SYSTEMS
FOR THE
UNITED STATES OF NORTH AMERICA
BY
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Read this list of contents

Part I.—Electric Power Industry; Suggested Power Districts and Proposed Constant-Potential Transmission Systems.

Brief History of the United States Electric Power Industry
Present Status of Electrical Industry
Advantage of Grouping Small Plants into Large Systems
Problems of the Power Industry
Suggested Regional Electric Power Districts. Outline of Suggested Regional Power Districts
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Mechanical and Electrical Power in Mines and Quarries
Railway Data and Discussion
Effect of Diversity on Load Factor
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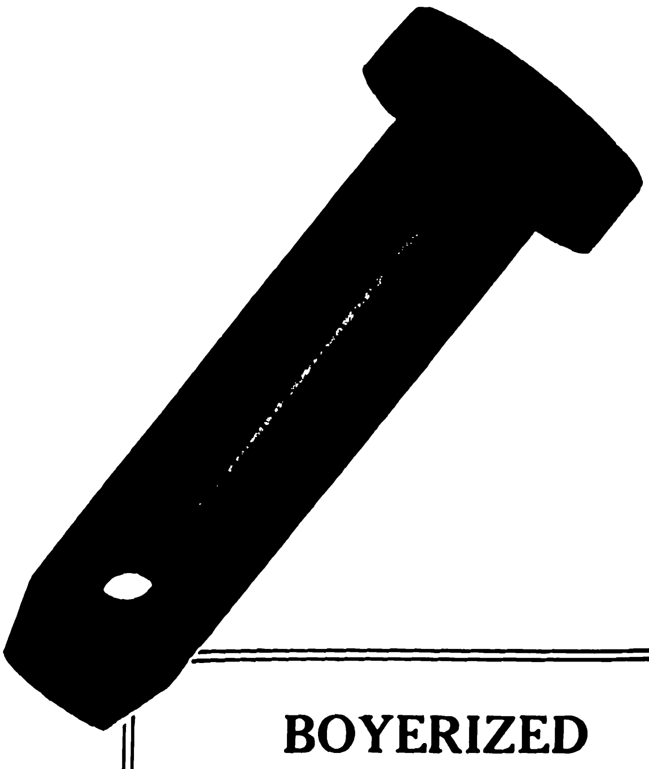

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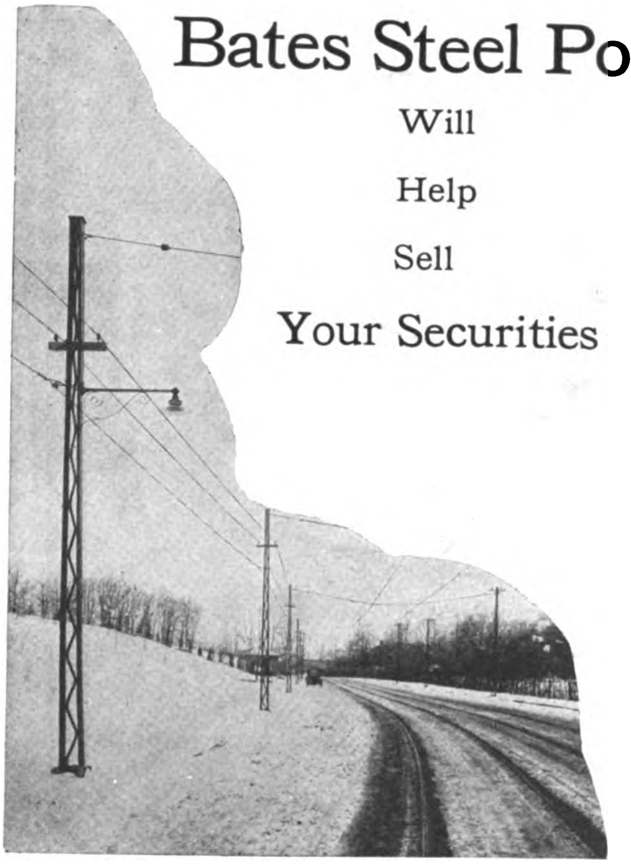

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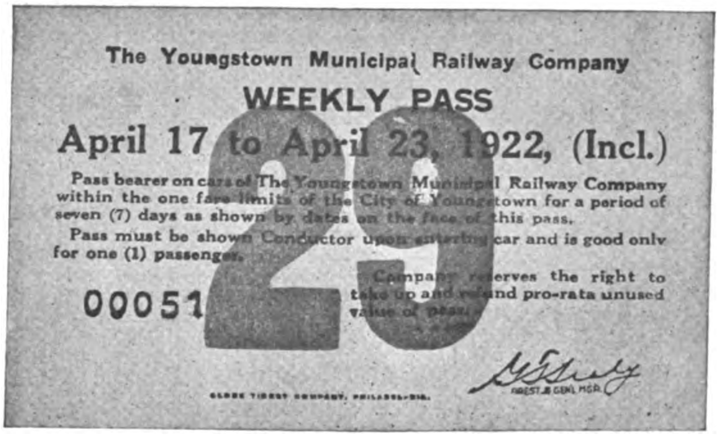

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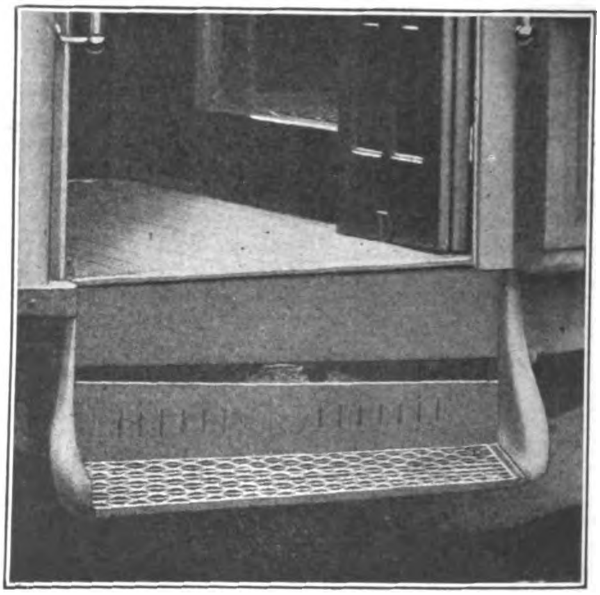

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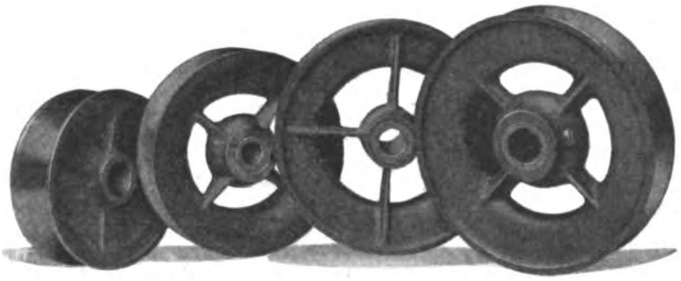

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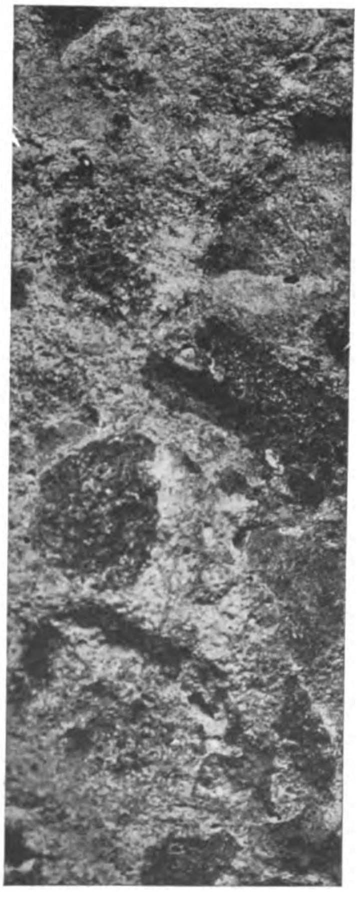

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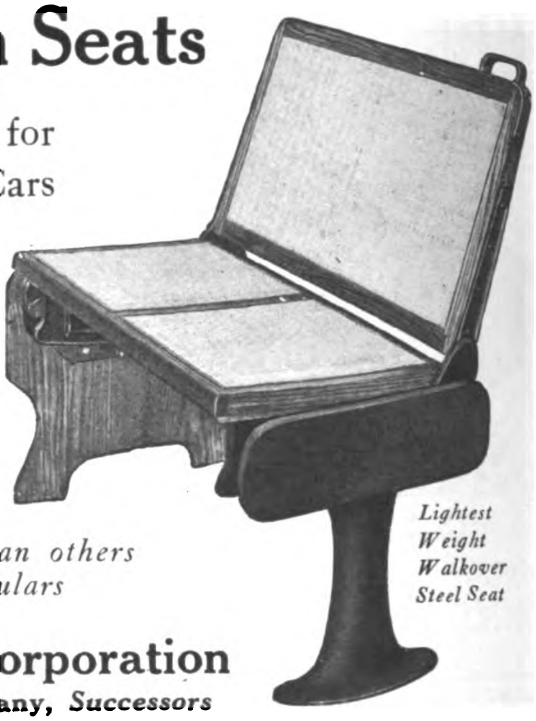
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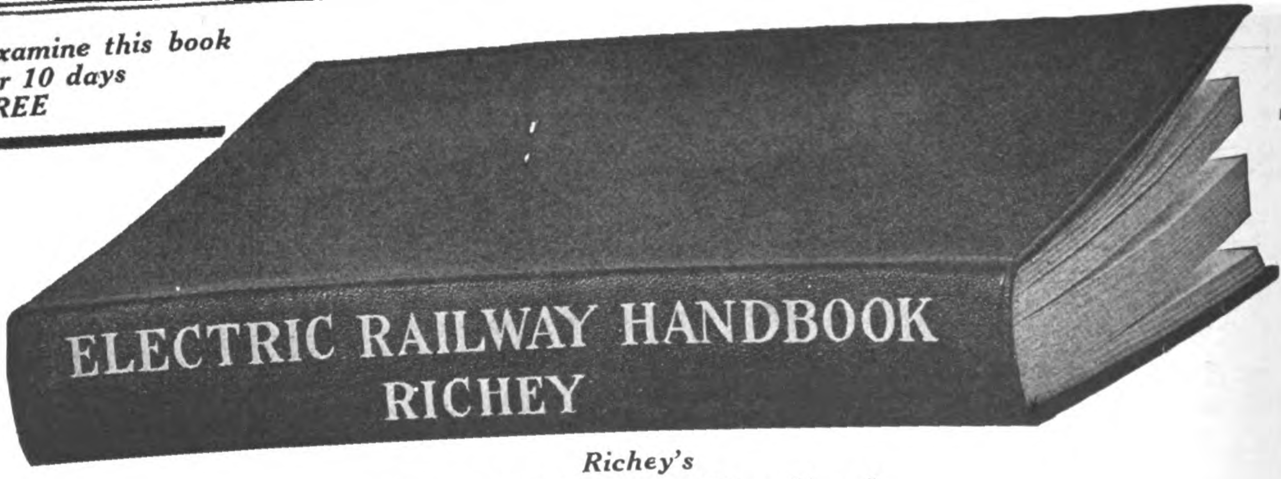

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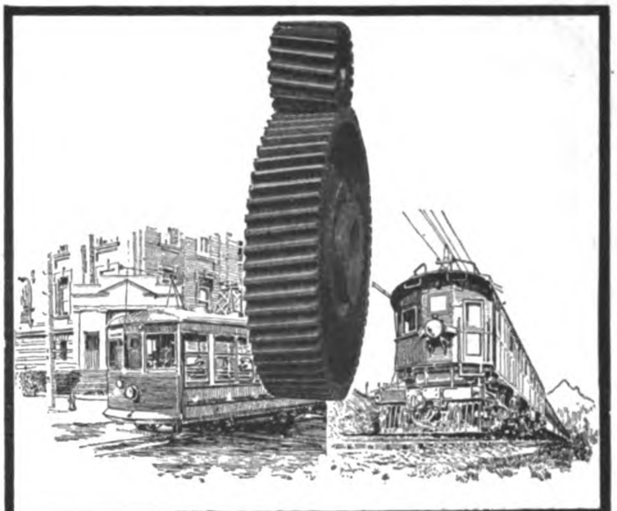

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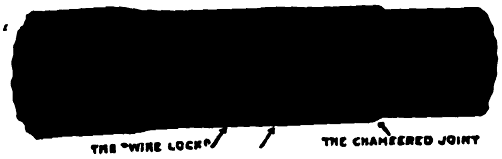

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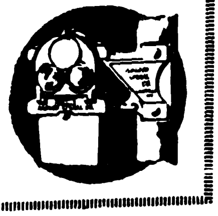

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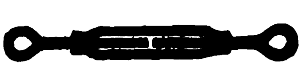

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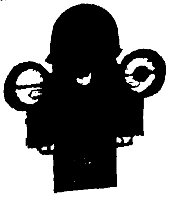

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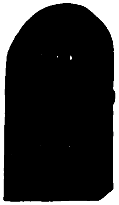

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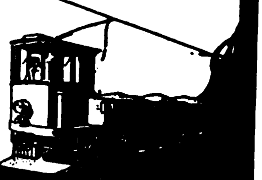

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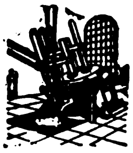

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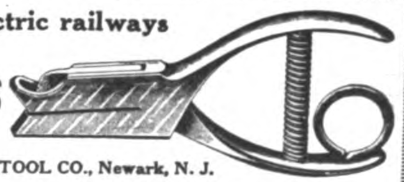

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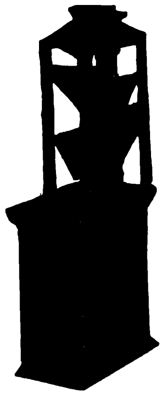

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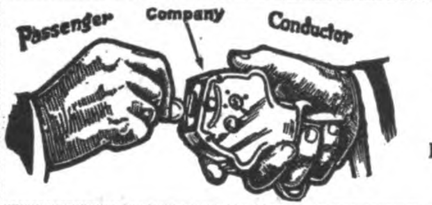

Direct Automatic Registration
By the
Passengers

Rooke Automatic Register Co.
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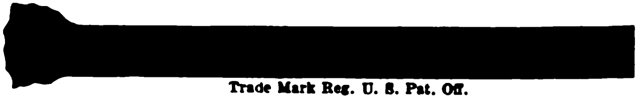

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Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.

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Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

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The Peter Smith Heater Company
1725 Mt. Elliott Ave., Detroit, Mich.

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED

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GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

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INTERNATIONAL OXYGEN COMPANY
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Sole Manufacturers
"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings;
also ELECTRIC THERMOMETER CONTROL
of Car Temperatures.

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Write for Catalogue

1328 Broadway
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FORD TRIBLOC

A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only block that carries a five-year guarantee.

FORD CHAIN BLOCK CO.
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The N-L New Style Type "C" Ventilator is absolutely weatherproof, lies low on the roof, looks well and meets every requirement of ventilation.

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Railway and Power Engineering Corporation, Ltd.
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WANTED

2 SNOW SWEEPERS

Single truck with or without equipment.

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1—Laidlaw - Dunn - Gordon electrically operated, horizontal, duplex, twin tandem, four stage, for 1000 cu. ft. displacement to 1000 lbs. pressure at 112 r.p.m., size 14½ in. x 8⅞ in. x 6⅞ in. x 4 in. x 24 in. Driven by a 400-hp., 2200 v., 25 cy., 3 ph., slip ring induction motor; mounted directly upon the crank shaft. Floor space, 16 ft. x 42 ft. Condition, fair. Will sell at bargain price. Make us an offer.

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on the
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and your
Advertisements in it

POSITIONS VACANT

TWO master mechanics wanted, 1 for city with 45 city cars, 1 for interurban with 40 interurban cars. Both shops located in the Middle West. Have good shops, tools and machinery. P-567, Elec. Railway Journal, Leader-News Bldg., Cleveland, Ohio.

POSITIONS WANTED

BARN SUPERINTENDENT, or assistant to Master Mechanic. 15 years' shop and car house experience, also familiar with operating rules and schedules. Good reason for making change. Best of references. Married, age 38, good health. PW-575, Elec. Railway Journal, Real Estate Trust Bldg., Philadelphia, Pa.

POSITIONS WANTED

GRADUATE civil engineer, widely experienced in all forms of transportation, steam and municipal; specialist in problems of electric railway efficiency, routing, extensions, schedules, etc.; thoroughly conversant with urban transportation economics and operation methods; energetic and capable executive with keen, analytical mind, at present engaged but desires change of activities. PW 577, Electric Railway Journal, 10th Ave at 36th St., New York.

MANAGER or superintendent railway, light and power properties, technical successful organizer and tactful in public relations and very resourceful in rehabilitating properties. Member A.I.E.E. Available in 30 days. PW-557, Elec. Railway Journal, 10th Ave. at 36th St., New York.

POSITIONS WANTED

SUPERINTENDENT of transportation, with a proven successful record of nineteen years on city, suburban and interurban properties, solicits correspondence with managers who are in need of a capable, efficient superintendent; successful in dealing with public and labor; recognized as an operating official who gets results; at present with large property; personal reasons for desiring a change. High grade references furnished as to ability to take over any property and get results. PW-568. Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

Good Relaying Rails

Are as Serviceable as New Rails, with a Big Saving on the Price

We have ready for prompt shipment First-Class Relaying Rails in various weights. Get in touch with us, stating what weight rail and tonnage desired, and we will submit quotations.

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Relaying Rails

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25-Ton All Steel

BALDWIN ELECTRIC LOCOMOTIVE

Fully Equipped

Excellent Condition

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FS-566, Electric Railway Journal
10th Ave. at 36th St., New York City

FOR SALE

20—Peter Witt Cars

Weight Complete, 33,000 lbs.

Seat 53. 4—G. E. No. 258-C Motors. K-12-H Control, West. Air Taylor Trucks. R.H. Type. Complete.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

The Department of Street Railways

CITY OF DETROIT

is offering for sale

6—2 Arc Wilson Plastic-arc Gasoline Driven Welders, equipped with two KA-Welding Panels, each on skids, manufactured by the Wilson Welders & Metals Company of New York City.

This equipment is in first class condition, having been thoroughly overhauled by our own department and may be inspected at the machinery warehouse, Department of Street Railways, St. Jean and Shoemaker Avenues.

Proposals are solicited for all or any part of the above offering and these may be directed to Geo. J. Finn, Commissioner, Department of Purchases and Supplies, 710 Marquette Building, Detroit, Michigan.

These proposals will have our consideration on Wednesday, July 25th, 1923, at 10:30 A. M., at which time we will answer all communications covering proposals on this equipment.

FOR SALE

3—J. G. Brill One Man Safety Cars

Equipped with 2 G. E. No. 67 Motors, G. E. B23 Controls 35 ft. long, single truck, good condition.

Immediate shipment. Further information on request.

WEST VIRGINIA UTILITIES CO.
MORGANTOWN, W. VA.

FOR SALE

25 SAFETY CARS

The Department of Street Railways, City of Detroit, is offering for sale 25 single truck, double end Safety Cars, equipped with electric heaters, thermostats, headlinings, center lighting, opal shades, air-operated National R-7 registers, air-operated snow scrapers, steel wheels and approximate weight of cars is 17,000 pounds.

This equipment is approximately two years old and may be inspected by calling at the Department of Street Railways, Detroit, Michigan.

Proposals are solicited for all or any part of the above offering and these may be directed to Geo. J. Finn, Commissioner, Department of Purchases and Supplies, 710 Marquette Building, Detroit, Michigan.

These proposals will be opened on Thursday August 2nd, 1923 at 10:30 A.M. at which time consideration will be given to all bids submitted.

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

- **Advertising, Street Car**
  - Collier, Inc., Barron G.
- **Air Receivers, Aftercoolers**
  - Ingersoll-Rand Co.
- **Anchors, Guy**
  - Electric Service Sup. Co.
  - Ohio Brass Co.
  - Standard Steel Works Co.
  - Westinghouse E. & M. Co.
- **Armature Shop Tools**
  - Electric Service Sup. Co.
- **Automatic Return Switch Stands**
  - Ramapo Ajax Corp.
- **Automatic Safety Switch Stands**
  - Ramapo Ajax Corp.
- **Axles**
  - Bemis Car Truck Co.
- **Axles, Car Wheel**
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
  - Carnegie Steel Co.
  - Westinghouse E. & M. Co.
- **Axle Straighteners**
  - Columbia M. W. & M. I. Co.
- **Babbitting Devices**
  - Columbia M. W. & M. I. Co.
- **Badges and Buttons**
  - Electric Service Sup. Co.
  - Internat'l Register Co., The
- **Barges, Steel**
  - American Bridge Co.
- **Bearings an Bearing Metals**
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - Gilbert & Sons, B. F. A.
  - Westinghouse E. & M. Co.
- **Bearings Center and Roller Side**
  - Stucki Co., A.
- **Bearings, Roller**
  - Stafford Roller Bearing Car Truck Corp.
- **Bells and Gongs**
  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
  - Consolidated Car-Heating Co.
  - Electric Service Sup. Co.
- **Boilers**
  - Babcock & Wilcox Co.
- **Bonding Apparatus**
  - American Steel & Wire Co.
  - Electric Railway Improvement Co.
  - Electric Service Sup. Co.
  - Ohio Brass Co.
  - Railway Track-work Co.
  - Rail Welding & Bonding Co.
- **Bonds, Rail**
  - American Steel & Wire Co.
  - Electric Railway Improvement Co.
  - Electric Service Sup. Co.
  - General Electric Co.
  - Ohio Brass Co.
  - Railway Track-work Co.
  - Rail Welding & Bonding Co.
  - Westinghouse E. & M. Co.
- **Book Publishers**
  - McGraw-Hill Book Co., Inc.
- **Brackets and Cross Arms (See also Poles, Ties Posts, etc.)**
  - Bates Exp. Steel & Tr. Co.
  - Electric Ry. Equip. Co.
  - Electric Service Sup. Co.
  - Hubbard & Co.
  - Ohio Brass Co.
- **Brake Adjusters**
  - National Ry. Appliance Co.
  - Westinghouse Tr. Br. Co.
- **Brake Shoes**
  - Amer. Br. Shoe & Fdry. Co.
  - Barbour-Stockwell Co.
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
- **Brakes, Brake Systems and Brake Parts**
  - Ackley Brake & Supply Corp.
  - Allis-Chalmers Mfg. Co.
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - National Brake Co.
  - Westinghouse Tr. Br. Co.
- **Bridges, Steel**
  - American Bridge Co.
- **Brushes, Carbon**
  - General Electric Co.
  - Jeandron, W. J.
  - Le Carbone Co.
  - Stackpole Carbon Co.
  - U. S. Graphite Co.
  - Westinghouse E. & M. Co.
- **Brushes, Graphite**
  - U. S. Graphite Co.
- **Brush Holders**
  - Anderson Mfg. Co., A. & J. M.
  - Columbia M. W. & M. I. Co.
- **Brushes, Wire Pneumatic**
  - Ingersoll-Rand Co.
- **Buildings, Steel**
  - American Bridge Co.
- **Buses, Motor**
  - Brill Co., The J. G.
- **Bushings**
  - National Vulcanized Fibre Co.
- **Bushings, Case Hardened and Manganese**
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
- **Cables (See Wires and Cables)**
- **Cambric, Tapes, Yellow and Black Varnished**
  - Irvington Varnish & Ins. Co.
- **Carbon Brushes (See Brushes Carbon)**
- **Car Lighting Fixtures**
  - Electric Service Sup. Co.
- **Car Panel Safety Switches**
  - Consolidated Car Heating Co.
  - Westinghouse E. & M. Co.
- **Cars, Dump**
  - Differential Steel Car Co.
  - St. Louis Car Co.
- **Cars, Passenger, Freight Express, etc.**
  - Amer. Car Co.
  - Brill Co., The J. G.
  - Kuhlman Car Co., G. C.
  - National Ry. Appliance Co.
  - Wason Mfg. Co.
- **Cars, Second Hand**
  - Electric Equipment Co.
- **Cars, Self-Propelled**
  - General Electric Co.
- **Castings, Brass, Composition or Copper**
  - Anderson Mfg. Co., A. & J. M.
  - Columbia M. W. & M. I. Co.
- **Castings, Gray Iron and Steel**
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
- **Castings, Malleable and Brass**
  - Amer. Brake Shoe & Fdry. Co.
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
- **Catchers and Retrievers, Trolley**
  - Electric Service Sup. Co.
  - Ohio Brass Co.
  - Wood Co., Chas. N.
- **Catenary Construction**
  - Archbold-Brady Co.
- **Change Carriers**
  - Cleveland Fare Box Co.
- **Circuit Breakers**
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Clamps and Connectors for Wires and Cables**
  - Anderson Mfg. Co., A. & J. M.
  - Electric Ry. Equip. Co.
  - Electric Service Sup. Co.
  - General Electric Co.
  - Hubbard & Co.
  - Ohio Brass Co.
  - Westinghouse E. & M. Co.
- **Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)**
  - Brill Co., The J. G.
  - Ohio Brass Co.
- **Clusters and Sockets**
  - General Electric Co.
- **Coal and Ash Handling (See Conveying and Hoisting Machinery)**
- **Coil Banding and Winding Machines**
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
- **Coils, Armature and Field**
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
- **Coils, Choke and Kicking**
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Coin-Counting Machines**
  - Cleveland Fare Box Co.
  - Electric Service Sup. Co.
  - Internat'l Register Co., The
- **Coin Sorting Machines**
  - Cleveland Fare Box Co.
- **Coin Wrapping Machines**
  - Cleveland Fare Box Co
- **Commutator Slotters**
  - Electric Service Sup. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Commutator Truing Devices**
  - General Electric Co.
- **Commutators or Parts**
  - Cameron Elec'l Mfg. Co.
  - Columbia M. W. & M. I. Co.
  - Westinghouse E. & M. Co.
- **Compressors, Air**
  - Allis-Chalmers Mfg. Co.
  - General Electric Co.
  - Ingersoll-Rand Co.
  - Westinghouse Tr. Br. Co.
- **Compressors, Air, Portable**
  - Ingersoll-Rand Co.
- **Condensers**
  - Allis-Chalmers Mfg. Co.
  - General Electric Co.
  - Ingersoll-Rand Co.
  - Westinghouse E. & M. Co.
- **Condensor, Papers**
  - Irvington Varnish & Ins. Co.
- **Conduits, Flexible**
  - Alphaduct Co., The
- **Connectors, Solderless**
  - Westinghouse E. & M. Co.
- **Connectors, Trailer Car**
  - Consolidated Car-Heat'g Co.
  - Electric Service Sup. Co.
  - Ohio Brass Co.
- **Controllers or Parts**
  - Allis-Chalmers Mfg. Co.
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Controller Regulators**
  - Electric Service Sup. Co.
- **Controlling Systems**
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Converters, Rotary**
  - Allis-Chalmers Mfg. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Conveying and Hoisting Machinery**
  - Columbia M. W. & M. I. Co.
- **Copper Wire**
  - Anaconda Copper Min. Co.
  - Page Steel & Wire Co.
  - Rome Wire Co.
- **Cord Adjusters**
  - National Vulcanized Fibre Co.
- **Cord, Bell, Trolley Register, etc.**
  - Brill Co., The J. G.
  - Electric Service Sup. Co.
  - Internat'l Register Co., The
  - Roebling's Sons Co., J. A.
  - Samson Cordage Works
- **Cord Connectors and Couplers**
  - Electric Service Sup. Co.
  - Samson Cordage Works
  - Wood, Co., Chas. N.
- **Couplers, Car**
  - Brill Co., The J. G.
  - Ohio Brass Co.
  - Westinghouse Tr. Br. Co.
- **Cranes**
  - Allis-Chalmers Mfg. Co.
- **Cross Arms (See Brackets)**
- **Crossings**
  - Ramapo Ajax Corp.
- **Crossing Foundations**
  - International Steel Tie Co.
- **Crossing Frog and Switch**
  - Ramapo Ajax Corp.
  - Wharton, Jr., & Co., Wm.
- **Crossing, Manganese**
  - Ramapo Ajax Corp.
- **Crossings Track (See Track, Special Work)**
- **Crossings, Trolley**
  - Ohio Brass Co.
- **Crushers, Rock**
  - Allis-Chalmers Mfg. Co.
- **Curtains and Curtain Fixtures**
  - Brill Co., The J. G.
  - Electric Service Sup. Co.
  - Morton Mfg. Co.
- **Dealers Machinery**
  - Electric Equipment Co.
  - General Electric Co.
- **Derailing Devices (See Track Work)**
- **Derailing Switches**
  - Ramapo Ajax Corp.
- **Destination Signs**
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
- **Detective Service**
  - Wish Service, P. Edward
- **Door Operating Devices**
  - Con. Car-Heating Co.
  - Nat'l Pneumatic Co., Inc.
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  - Brill Co., The J. G.
  - General Electric Co.
  - Hale & Kilburn
- **Doors, Folding Vestibule**
  - Nat'l Pneumatic Co., Inc.
- **Draft Rigging (See Couplers)**
- **Drills, Rock**
  - Ingersoll-Rand Co.
- **Drills, Track**
  - American Steel & Wire Co.
  - Electric Service Sup. Co.
  - Ingersoll-Rand Co.
  - Ohio Brass Co.
- **Dryers, Sand**
  - Electric Service Sup. Co.
- **Ears**
  - Ohio Brass Co.
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  - Amer. Electrical Works
  - American Steel & Wire Co.
  - Roebling's Sons Co., J. A.
  - Rome Wire Co.
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- **Electrodes, Steel**
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  - Allison & Co., J. R.
  - Archbold-Brady Co.
  - Arnold Co., The
  - Beeler, John A.
  - Bibbins, J. Rowland
  - Byllesby & Co., H. M.
  - Day & Zimmerman
  - Ford, Bacon & Davis
  - Hemphill & Wells
  - Holst, Englehardt W.
  - Jackson, Walter
  - Kelly Cooke Co.
  - Ong, Joe R.
  - Parsons, Klapp, Brinkerhoff & Douglas
  - Richey, Albert S.
  - Robinson & Co., Inc., Dwight P.
  - Sanderson & Porter
  - Sangster, Andrew & Co.
  - Stevens & Wood, Inc.
  - Stone & Webster
  - White Engineering Corp., The J. G.
  - Wortham, Edwin
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  - Ingersoll-Rand Co.
  - Westinghouse E. & M. Co.
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  - National Ry. Appliance Co.
  - Ohmer Fare Register Co.
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  - American Steel & Wire Co.
- **Fenders and Wheel Guards**
  - Brill Co., The J. G.
  - Consolidated Car Fender Co.
  - Electric Service Sup. Co.
- **Fibre and Fibre Tubing**
  - National Vulcanized Fibre Co.
  - Westinghouse E. & M. Co.
- **Field Coils (See Coils)**
- **Flangeway Guards, Steel**
  - Godwin Co., Inc., W. S.
- **Flooring-Grating**
  - Irving Iron Works
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  - Carnegie Steel Co.
  - Columbia M. W. & M. I. Co.
- **Frogs and Crossings, Tee Rail**
  - Ramapo Ajax Corp.
- **Frogs, Track**
  - (See Track Work)
  - Wharton, Jr., & Co., Wm.
- **Frogs, Trolley**
  - Ohio Brass Co.
- **Furnaces, Electric**
  - Pittsburgh Elec. Furnace Corp.
- **Fuses and Fuse Boxes**
  - Columbia M. W. & M. I. Co.
  - Consolidated Car-Heating Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Fuses, Refillable**
  - Columbia M. W. & M. I. Co.
- **Gages, Oil and Water**
  - Ohio Brass Co.
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  - Westinghouse Tr. Br. Co.
- **Gas-Electric Cars**
  - General Electric Co.
- **Gas Producers**
  - Westinghouse E. & M. Co.
- **Gates, Car**
  - Brill Co., The J. G.
- **Gear Blanks**
  - Carnegie Steel Co.
- **Gear Cases**
  - Chillingworth Mfg. Co.
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
  - Westinghouse E. & M. Co.
- **Gears and Pinions**
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  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
  - General Electric Co.
  - National Railway Appliance Co.
  - Nuttall Co., R. D.
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  - Lorain Steel Co.
- **Goggles, Eye**
  - Smith Heater Co., Peter
- **Gongs (See Bells and Gongs)**
- **Greases (See Lubricants)**
- **Grinders and Grinding Supplies**
  - Railway Track-work Co.
- **Grinders, Portable**
  - Railway Track-work Co.
- **Grinders, Portable Electric**
  - Railway Track-work Co.
- **Grinding Bricks and Wheels**
  - Railway Track-work Co.
- **Guard Rail Clamps.**
  - Ramapo Ajax Corp.
- **Guard Rails, Tee Rail and Manganese**
  - Ramapo Ajax Corp.
- **Guards, Trolley**
  - Electric Service Sup. Co.
  - Ohio Brass Co
- **Hammers, Pneumatic**
  - Ingersoll-Rand Co.
- **Harps, Trolley**
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  - Electric Service Sup. Co.
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  - Star Brass Works
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  - Anglo-American Varnish Co.
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  - Gold Car Heating & Lighting Co.
  - National Ry. Appliance Co.
  - Smith Heater Co., Peter
- **Heaters, Car, Hot Air and Water**
  - Smith Heater Co., Peter
- **Heaters, Car (Stove)**
  - Electric Service Sup. Co.
  - Sterling Varnish Co.
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  - Ohio Brass Co.
- **Hydraulic Machinery**
  - Allis-Chalmers Mfg. Co.
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  - General Electric Co.
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  - General Electric Co.
  - Irvington Varnish & Ins. Co.
  - National Vulcanised Fibre Co.
  - Okonite Co.
  - Standard Underground Cable Co.
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Griffin Wheel Company
McCormick Building
Chicago, Ill.

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F. C. S.
WHEELS**

For Street and Interurban Railways

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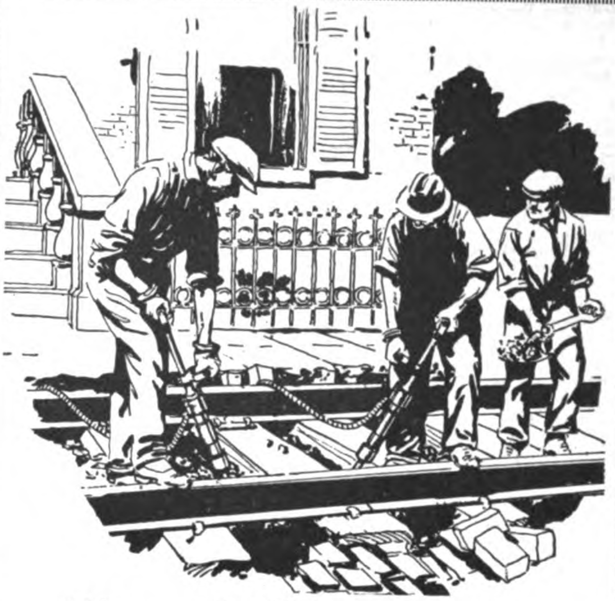

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Reduce track tamping and maintenance costs.

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Found The World Over

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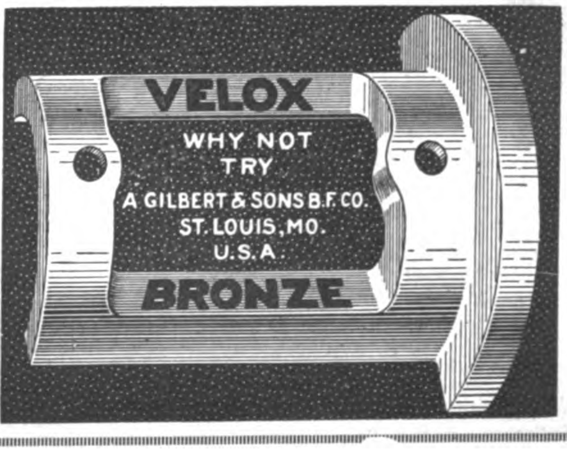

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Lapp Insulator Co.

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(See Rail Joints)

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Wharton, Jr., & Co., Wm.

Manganese Steel Guard Rails
Ramapo Ajax Corp.

Manganese Steel Special Track Work
Ramapo Ajax Corp.
Wharton, Jr., & Co., Wm.

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Motormen's Seats
Brill Co., The J. G.
Electric Service Sup. Co.
Heywood-Wakefield Co.
Wood Co., Chas. N.

Motors, Electric
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Godwin Co., Inc., W. S.

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Electric Service Sup. Co.
General Electric Co.
Wood Co., Chas. N.

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Pins, Case Hardened, Wood and Iron
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Electric Service Sup. Co.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Pipe Fittings
Westinghouse Tr. Br. Co.

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Plates for Tee Rail Switches
Ramapo Ajax Corp.

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Poles, Trolley
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Ingersoll-Rand Co.

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Rail Braces and Fastenings
Ramapo Ajax Corp.

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Carnegie Steel Co.
Rail Joint Co.

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Railway Safety Switches
Consolidated Car-Heating Co.
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Railway Track-Work Co.

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Electric Service Sup. Co.
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Sash, Metal Car Window
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Seats, Bus
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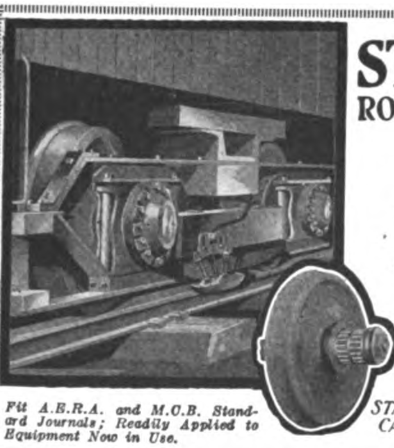

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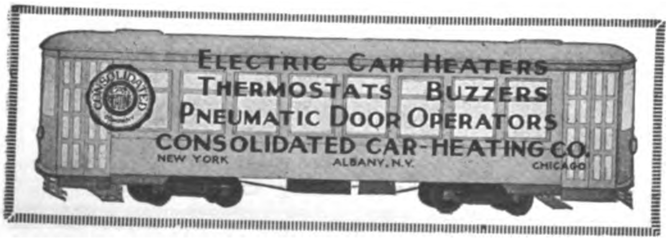

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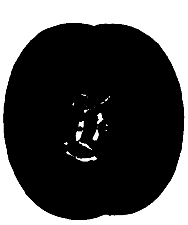

THE STAR BRASS WORKS
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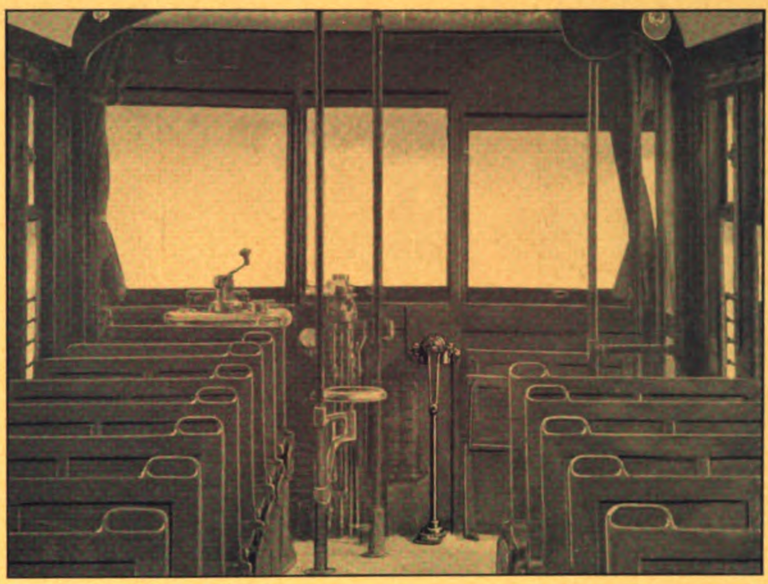
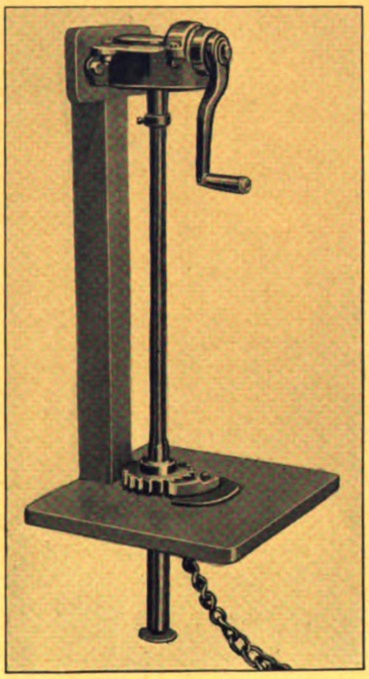
Best for Service—Durability and Economy. *Write Us.*
Chillingworth Mfg. Co.
Jersey City, N. J.

100 New Users in the Last Nine Months
KASS SAFETY TREADS
HIGH
in efficiency and lasting qualities
LOW
in weight, initial and upkeep costs
Morton Manufacturing Co., Chicago

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA





BRILL Vertical Handle Brake

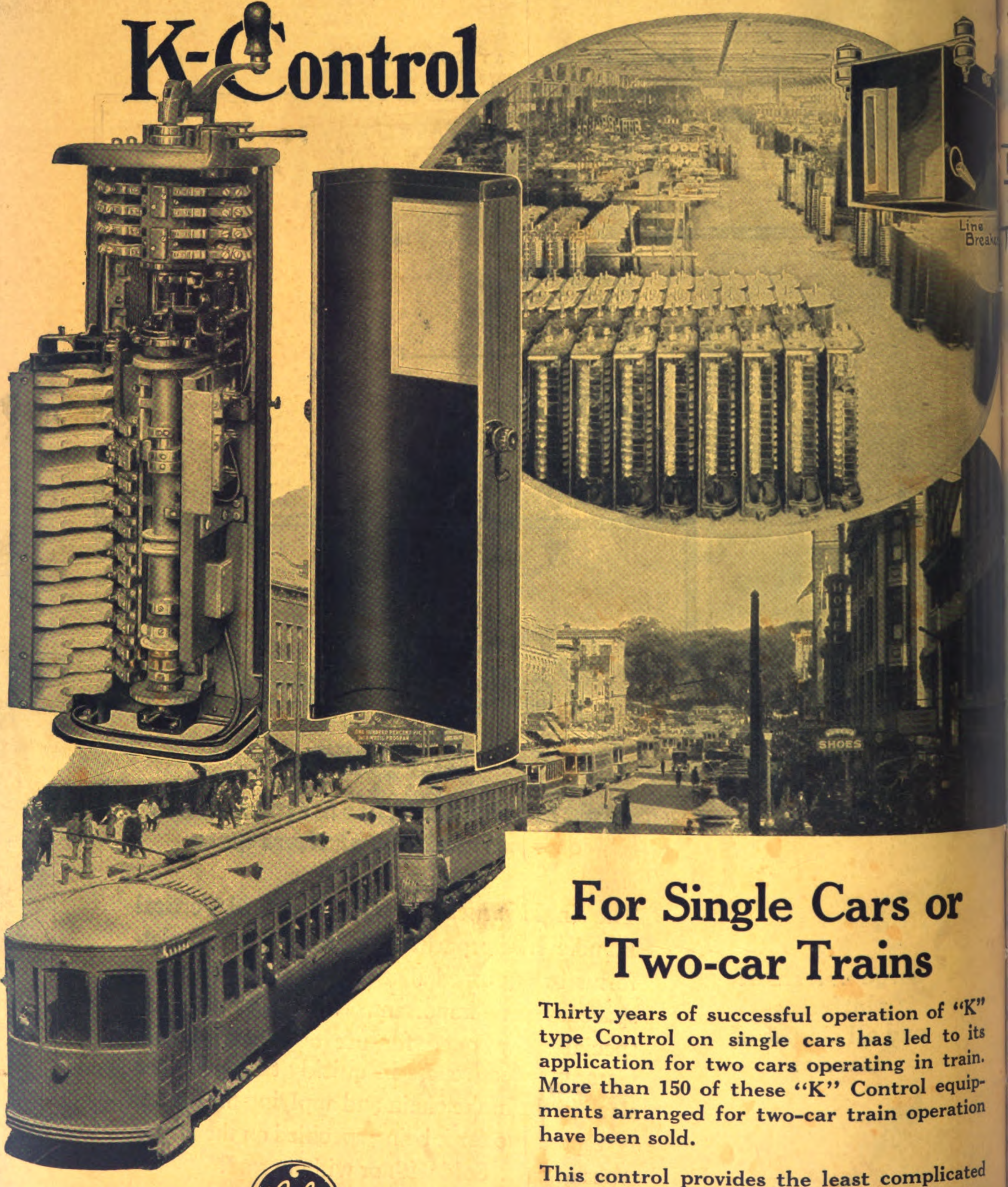
Light in weight, effective in operation and occupies minimum platform space

For large and small platforms and all classes of service

The single vertical handle of the Brill Vertical Handle Brake particularly adapts it for platforms so equipped that the economical use of space is highly important. While this brake was specially developed for use on Birney Safety Cars, its effectiveness in quickly taking up the slack in the brake chain and applying the brakes is responsible for it being specified on the larger types of cars. Sold with or without staff.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. — ST. LOUIS MO. — G. C. KUHLMAN CAR CO. — CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.

K-Control



For Single Cars or Two-car Trains

Thirty years of successful operation of "K" type Control on single cars has led to its application for two cars operating in train. More than 150 of these "K" Control equipments arranged for two-car train operation have been sold.

This control provides the least complicated and most economical method of obtaining two-car train operation.

There is a "K" Control available for every requirement—safety cars, motor cars with trailers, and two-car train operation.

General Electric Company
Schenectady, N. Y.

GENERAL ELECTRIC

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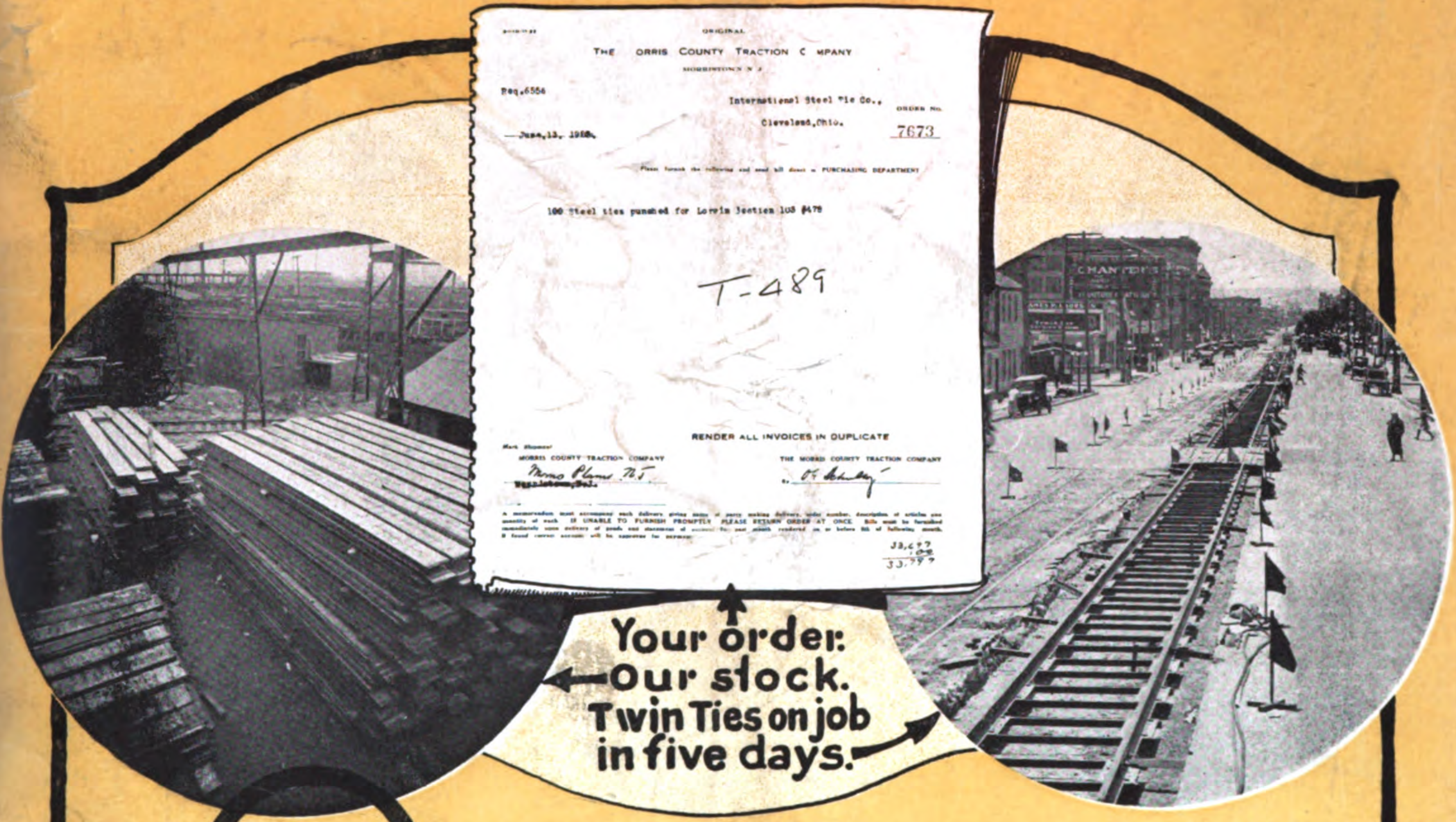
ELECTRIC RAILWAY JOURNAL

July 21, 1923



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THE ORRIS COUNTY TRACTION COMPANY
MORRISTOWN N J

Req. 6556

International Steel Tie Co.,
Cleveland, Ohio.

ORDER No. 7673

June, 13, 1923.

Please furnish the following and send bill direct to PURCHASING DEPARTMENT

100 Steel ties punched for Lorain Section 103 #478

T-489

RENDER ALL INVOICES IN DUPLICATE

Mark Shipment
MORRIS COUNTY TRACTION COMPANY
Morris Plains N.J.

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By

Your order:
Our stock.
Twin Ties on job in five days.

Quick shipments

You can be certain that specifying Twin Ties will help speed up your work by depending on our delivery as follows:

PARTIAL SHIPMENT IN THREE DAYS.
Carload or less—1200 to 3000 feet of track.

COMPLETE SHIPMENT IN TEN DAYS.
Any quantity up to five miles.

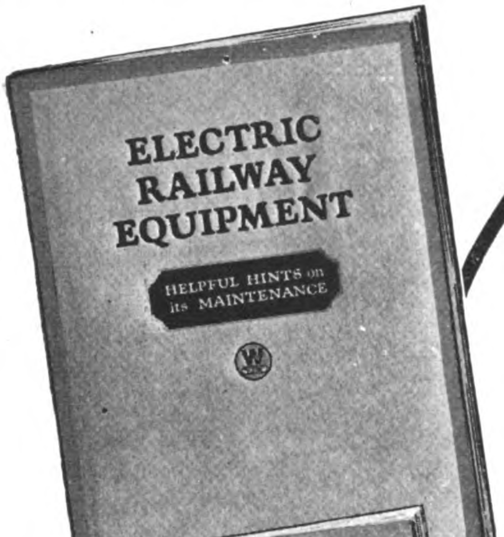
Present carload freight service within five-hundred-mile radius of Cleveland—five days.

Write or wire for price, guaranteed freight rate and definite shipping date.

THE INTERNATIONAL STEEL TIE COMPANY
Cleveland, Ohio

Steel Twin Tie Track

Helpful Hints On Maintenance


ELECTRIC
RAILWAY
EQUIPMENT
HELPFUL HINTS on its MAINTENANCE

Publications

Recognizing the great importance of the proper maintenance of electric railway systems, the Westinghouse Company issues numerous publications to assist railway operating men.

The illustrations show some of the more important of these publications, as follows:

Electric Railway Equipment illustrates more than fifty items of electric railway equipment, showing the important features of each and describing and recommending maintenance practice.

Railway Operating Data are used in many shops as text books for the maintenance of electric railway equipment.

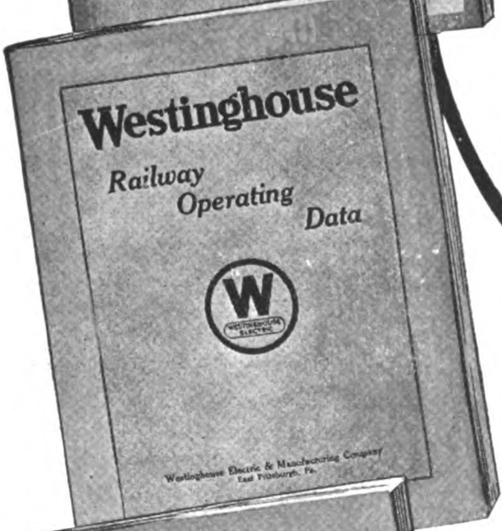
Cars and Car Equipment is a reference guide in the selection of car designs and motor and control applications.

Westinghouse Standard 600-Volt Railway Motors is of great help to superintendents of equipment in selecting from our standard line of motors the proper equipment for new or rehabilitated cars.

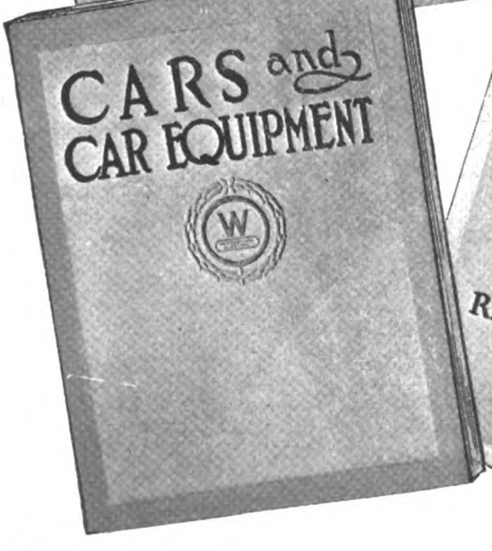
Part Catalogues illustrate and describe every part of the motor, and give the style and number and other information necessary in ordering renewal parts.

Railway Motor Leaflets show the rating, application, performance curve, and outline dimensions of a specific motor, illustrating and describing the important parts.

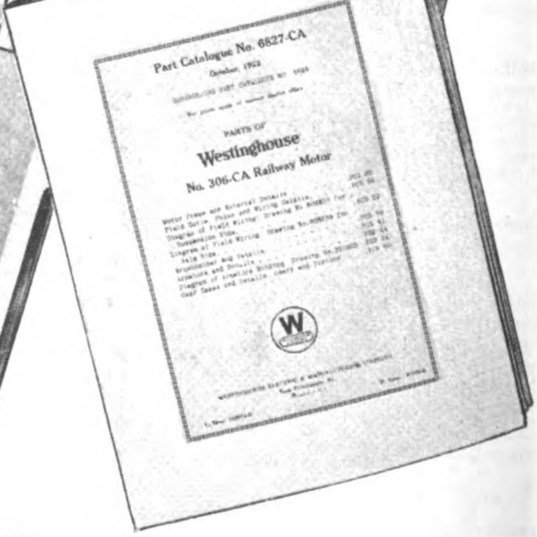
Westinghouse
Electric & Manufacturing Co.,
East Pittsburgh, Pa.


Westinghouse
Railway
Operating
Data
Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.
No. 508-A Railway Motor


CARS and
CAR EQUIPMENT

STANDARD
RAILWAY MOTORS
600 VOLT
A.E.R.A. STANDARDS


Part Catalogue No. 6827-CA
Parts of
Westinghouse
No. 306-CA Railway Motor

Westinghouse

Vol. 62, *No.* 3 New York, July 21, 1923 ***Pages* 83-122**

ELECTRIC RAILWAY JOURNAL

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BY C. L. BAXTER.

Standard welding equipment has been mounted in a motor car to provide a portable unit suitable for shop use.

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Apparatus is so designed that an extremely small quantity of compound is required. The fire hazard is reduced and the speed of operation is increased.

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Line car made from Ford truck can go anywhere, even though power is off. Useful both for line work and general construction.

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BY LOUIS A. MITCHELL.

City and interurban railway produces pictures and figures to show the condition of track after twelve years.

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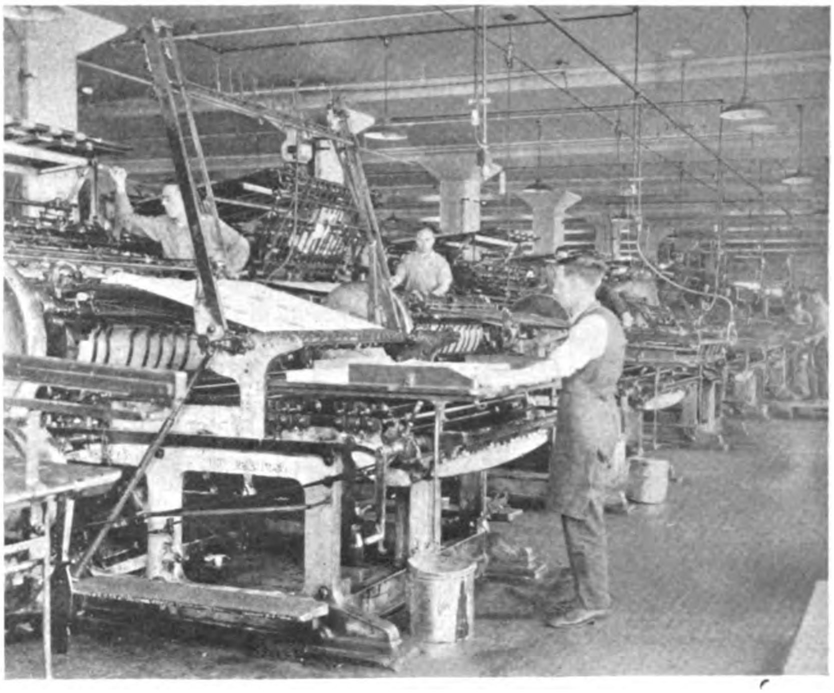

The Presses

LIKE the roar of a mighty waterfall is the sound that greets us as we open the door of the enormous press room. You now see ELECTRIC RAILWAY JOURNAL being printed from the type made by the linotype operators. The twenty-three presses, occupying nearly 15,000 sq.ft. of floor space, are turning out from 1,500 to 5,000 impressions apiece, per hour. You see great squares of blank paper automatically fed into some of the presses. An instant later, those sheets, now printed, drop lightly in front of you. On presses of another type, long flapping metal arms snatch the printed sheets, one by one, raise them high in the air and lay them down in orderly piles without causing even an abrasion. Gigantic rolls of white paper are fed into the intricate machinery of the swiftest presses; text and illustrations magically appear on both sides of the paper as it continues its rapid flight; and faster than you can follow, 32-page sections, neatly folded, ready for the bindery, come speeding forth, and are deftly halved and dropped right and left into huge receptacles. Four two-color presses are busily printing the attractive covers and ads of the JOURNAL and other publications from the House of McGraw-Hill.

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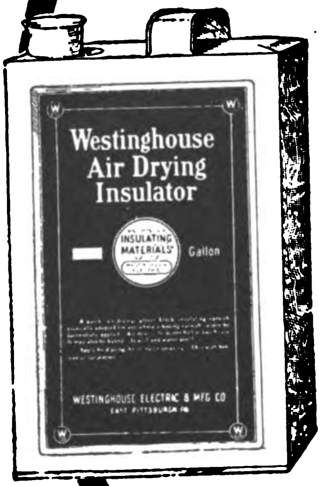
Advertising, Index—Alphabetical, 58; Classified, 54, 56; Searchlight Section, 50 to 53

Insulating Materials

A supply of dependable insulating materials is indispensable to the central station and it is of the greatest importance that the quality be of one grade—the best.

Westinghouse research engineers have spent more than thirty years in the development of insulating materials with constant thought of the part they play in the successful operation of electrical equipment. The products of their study have satisfactorily met the requirements of Westinghouse products just as they will meet the requirements of any apparatus in which the best insulation is essential.

Insulating materials, identical with those used so successfully in Westinghouse products, are available to the industry in handy containers, ready for instant use. And more over, a Westinghouse engineer is immediately available to help in the solution of any insulating problem that may arise.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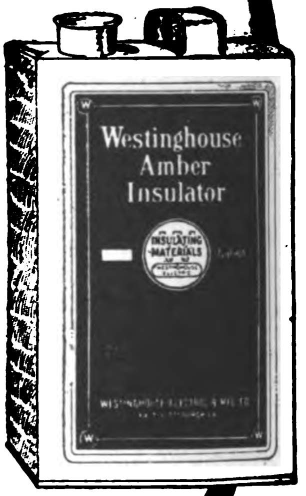
Insulator
INSULATING MATERIALS
Gallon
WESTINGHOUSE ELECTRIC & MFG CO
EAST PITTSBURGH PA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Insulator
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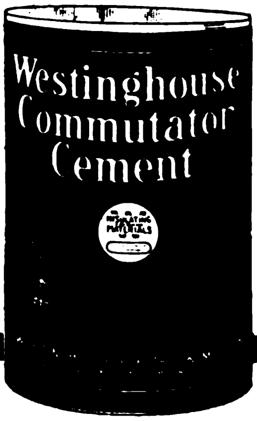

Westinghouse
Commutator
Cement
INSULATING MATERIALS

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.
Sales Offices In All Principal American Cities

Westinghouse

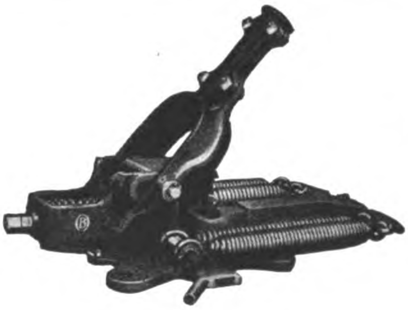
O-B in Wichita

This view of Douglas Avenue, Wichita, Kansas is representative of the business section of a modern busy city.

The impression given is one of activity and activity means that the people are on their toes and alert to all the requisites of a thriving city.

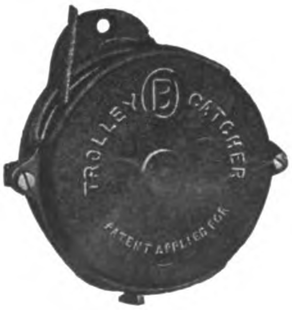
Modern buildings and modern street railway equipment are in evidence.

And in using O-B Trolley Bases and O-B Trolley Catchers on the street railway cars, the railway officials in Wichita are being consistent.



Form 1 Trolley Base. All bearing surfaces bushed.

Wichita is just one of many cities, both large and small, that have made O-B Car Equipment Specialties a part of their standard car equipment.



O-B Trolley Catcher. Does not release on trolley rebound.

The Ohio (B) Brass Co.
Mansfield, Ohio, U.S.A.

AERA

New York Philadelphia Pittsburgh Charleston, W. Va. Chicago Los Angeles San Francisco Paris, France
Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators

Insurance plus
Marsh & McLennan Service

Have You Finished
the Job Right?

Your personnel has been chosen wisely; your plant has been planned carefully; your methods are the last word in efficiency and your products find an insatiate market. Have you finished the job right?

If fire can damage your plant or accidents disorganize your personnel and drive your customers to waiting competitors, you cannot rest secure.

Insurance is the final and fitting step of the wise executive who finishes the job right. He takes care of today and has the vision to protect himself against the emergency that may come at any time. He is prepared against all contingencies by having adequate insurance for his business in all its branches.

As carefully as you choose your banker, just as carefully should you choose your insurance broker. The one assists, the other safeguards your business.

"He who serves best profits most."

MARSH & McLENNAN
175 W. Jackson Blvd. Chicago, Ill.

Minneapolis
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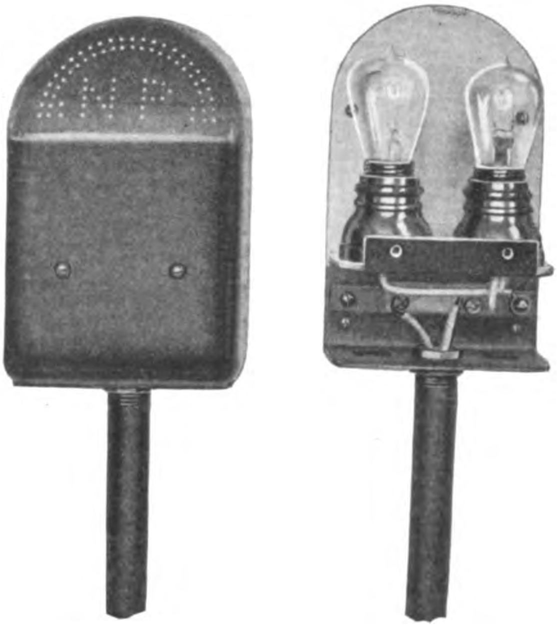
The clumsy old bell-rope



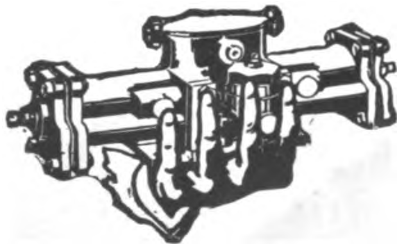
should have died with the cable car

When electricity took the place of straining jerking cables, a better method of signaling became possible. Hanging speed and safety on the conductor's bell-rope is indefensible today.

N P Motorman's Signal Light

Shortens stops— Avoids accidents

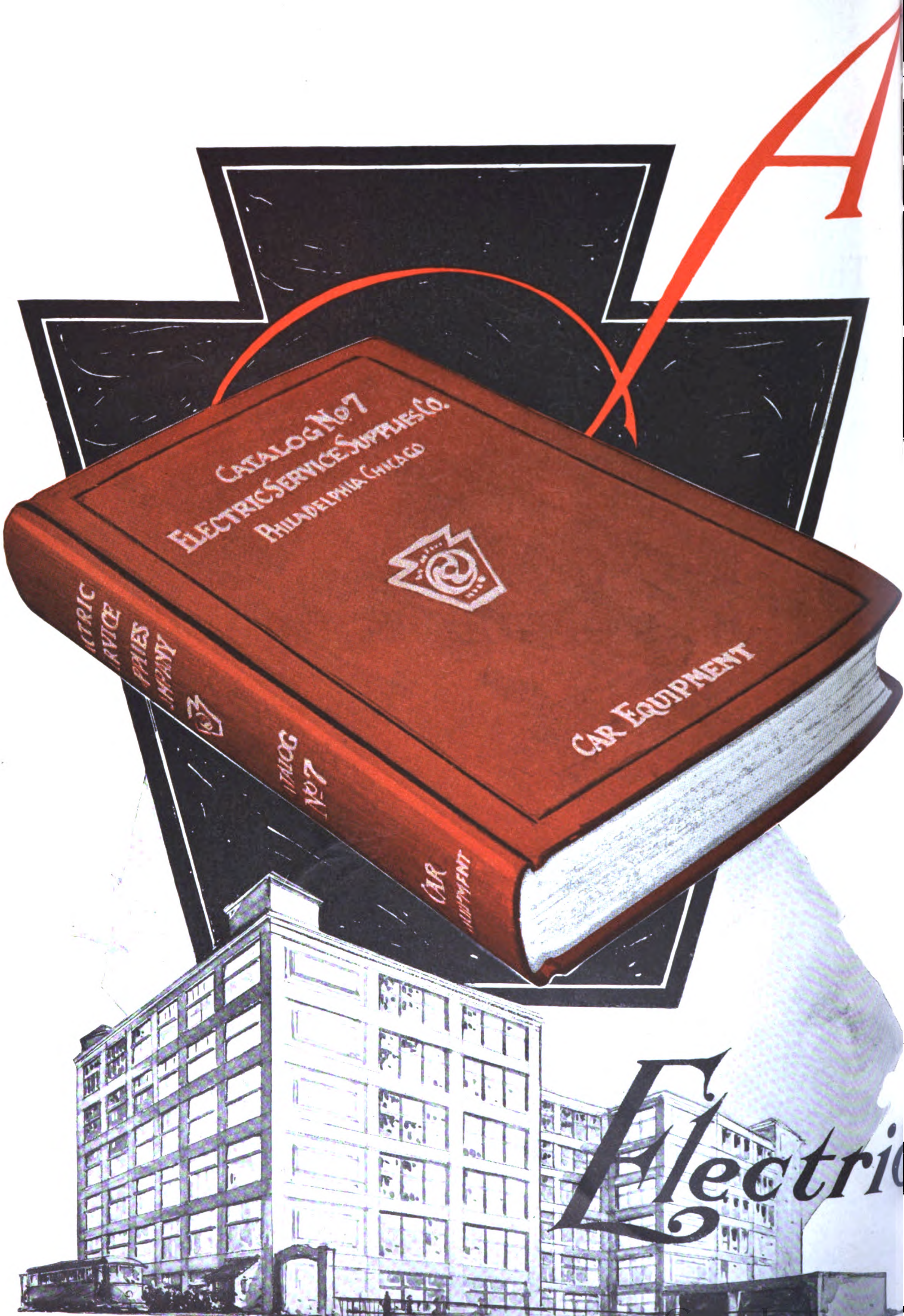
"Two bells" are obsolete! The National Pneumatic electric tell-tale takes the place of the bell. With this device before his eyes, the motorman knows the instant doors are closed and passengers safely on board. No premature starts to spill the unlucky rider, nor yet any wasted seconds waiting for conductor's signals.



Other time-saving, safety-making
NATIONAL PNEUMATIC DEVICES

Door and Step Control—Door and Step Operating Mechanisms—Safety Interlocking Door Control—Multiple Unit Door Control

National Pneumatic Co.
Originators and Manufacturers
Principal Office: 50 Church St., New York
Philadelphia—Colonial Trust Bldg. Chicago—McCormick Bldg. Works—Rahway, New Jersey.
Manufactured in Canada by
Dominion Wheel & Foundries, Ltd., Toronto, Ont.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A Valuable Reference Book for—

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This book will take the place of the data sheets, the circulars, and the letters which you have tucked away in various files. It will always be at hand, with its complete and comprehensive index, ready to answer equipment questions whenever they arise. It's the biggest thing of its kind in the industry.

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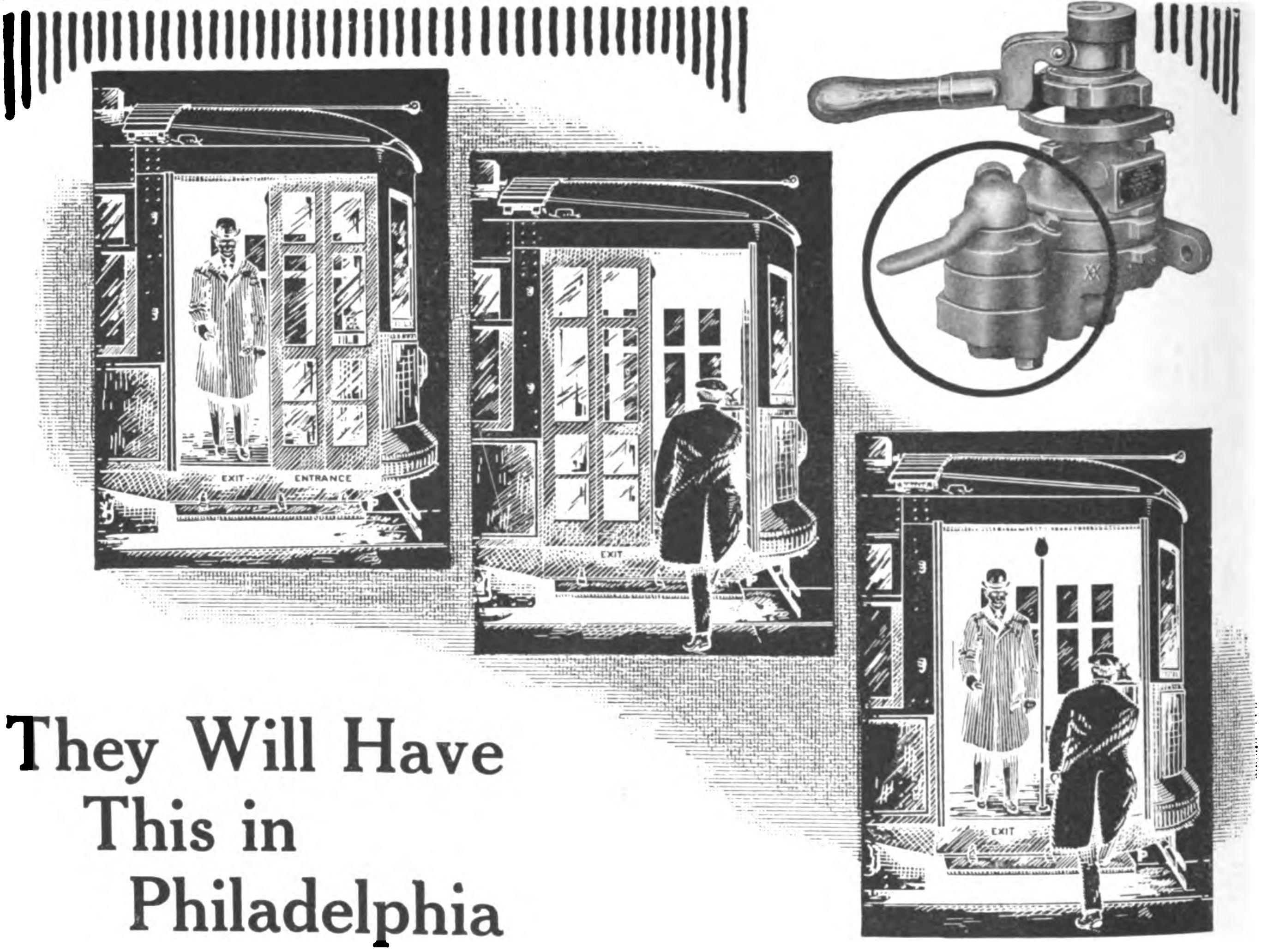
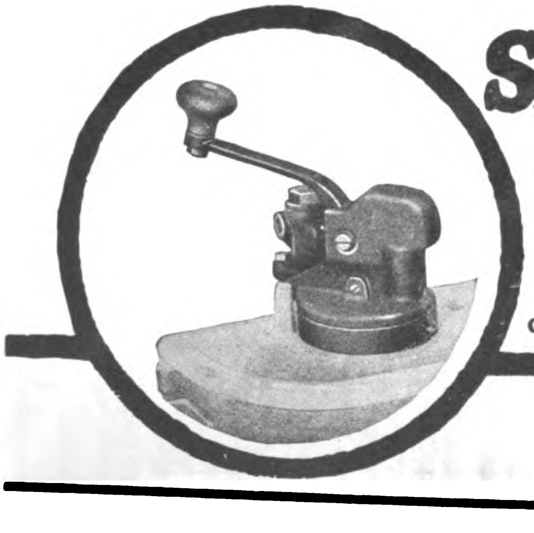


They Will Have This in Philadelphia

The 385 single-end Safety Cars ordered by the Philadelphia Rapid Transit Company will be placed in service with the new Selector Door Control Valve as a standard part of the regular Safety Car control equipment.

These cars will have double passageways, as shown above. The two doors will be operated independently at the discretion of the motorman. No confusion, no delay in passenger interchange. No unnecessary exposure of those inside to cold or rain when occasion calls for only one door. In winter, less consumption of power for heating purposes. Winter and summer, maximum safety and convenience for everyone.



SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.
Postal and Telegraphic Address:
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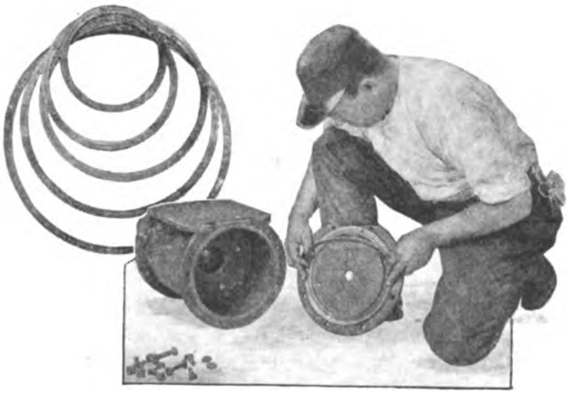
CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH

A New Addition to the

Wabco Family!



WABCO Brake Cylinder Gaskets

The great success of Wabco Brake Cylinder Packing Cups has led to the development of another Wabco product—Wabco Brake Cylinder Pressure Head Gaskets.

All those interested in Air Brake maintenance are familiar with the matchless efficiency and economy of Wabco Cups.

Wabco Gaskets will be found to offer the same advantages.

Wabco is the name of a special-processed material and the use of the name on any cup or gasket is a guarantee of superior quality and service.

"COST LESS BECAUSE
THEY LAST LONGER"

Westinghouse Traction Brake Company
General Office and Works: Wilmerding, Pa.

WESTINGHOUSE TRACTION BRAKES

You Benefit by Our Double Check

EVERY step in the International Treating process is checked in our chemical laboratory. Even though we know that our plants are equipped with every modern mechanical device to assure accuracy and thoroughness we go one step further—we check the actual results, which precaution serves as a double check to convince ourselves and you that we deliver exactly as you specify.

After seasoning and before treatment, tests are made for moisture in the ties. Every lot of Creosote Oil and Zinc Chloride is analyzed carefully before use. Increment borings are taken from ties on every tram immediately after treatment to check the depth of penetration.

By means of these tests we eliminate all guess work—we get the facts, for ultimate life of ties in track depends on facts—good live timber to start with, quick removal from the woods, careful seasoning and thorough treatment. Then and only then will you have a tie that will give long, dependable service and will not crush under the rail.

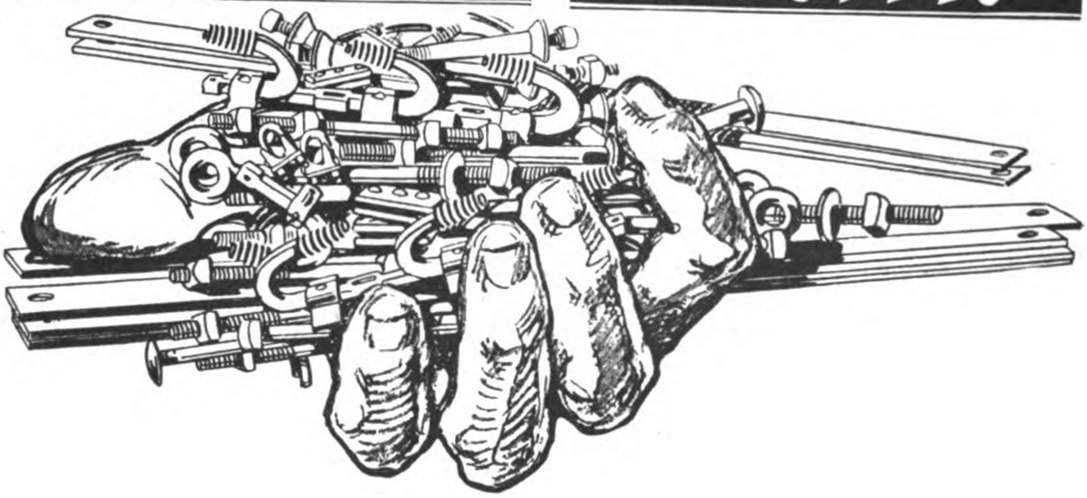
The Tie that Lasts Longest Is Least Expensive.

International Ties are just such ties—a trial order will convince

International Creosoting & Construction Co.

General Office—Galveston, Texas
Plants: Texarkana, Texas Beaumont, Texas
Galveston, Texas

Western Electric



Everything for Your Power Lines on One Order

Our House near you brings everything to construct and maintain power lines practically to the job.

Its nearness saves you time and money.

You can use its reserve stocks as your own.

You can hold your stocks down and avoid depreciation and obsolescence losses.

This House near you is part of a system of 48, distributing everything electrical and selling for a long list of nationally known manufacturers. By doing so it reduces selling expenses and gives them quantity production. These economies pass on to those using the service.

Write our nearest House and learn exactly what it can do for your particular needs.

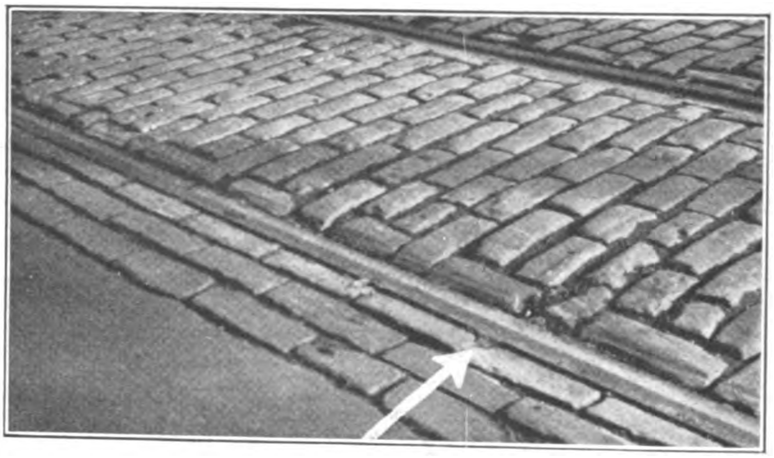
A
NATIONAL
ELECTRICAL
SERVICE

Western Electric Company

OFFICES IN ALL PRINCIPAL CITIES

Construction work is never delayed by

THERMIT RAIL WELDS



A Thermit Rail Weld—They won't have to open up this pavement again for joint renewals!

The Thermit welding process makes it possible to install them any time—during construction or years after.

When new track is being laid it may be better to keep the welding operations up with track layers,—but it isn't necessary. Even paving can be laid, and only small openings need be left at rail ends for Thermit welding. The cost is low which ever way you do it.

On old track, where joints are becoming increasingly expensive to maintain, Thermit Rail Welds can be used to prolong the life of track for many years.

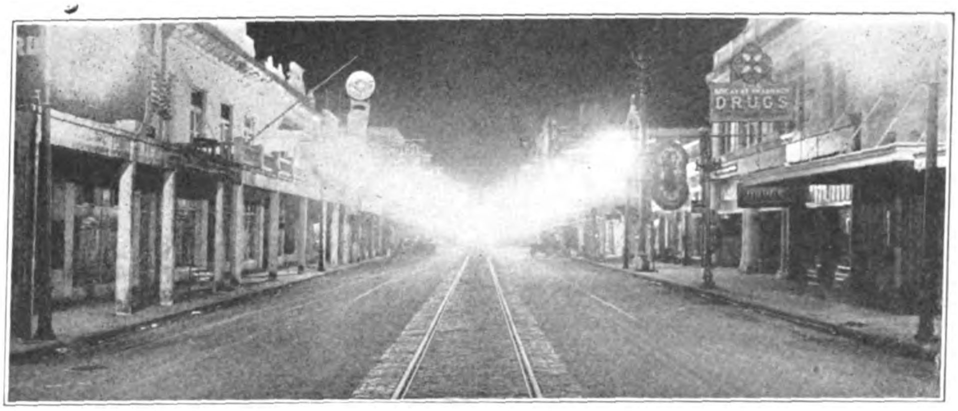
They mean economy because they

Eliminate the joints
Eliminate the rail bonds
Last as long as the rail
Make the rail last longer.

If you contemplate any track construction tell us the approximate number of joints and section number of rail so that we can submit an estimate on the cost of eliminating your joints and prolonging the life of your track.

Metal & Thermit Corporation
120 Broadway, New York
BOSTON PITTSBURGH CHICAGO S. SAN FRANCISCO TORONTO

ELRECO



Civic Pride

Some communities are just bursting with it—others are almost entirely lacking in it.

Look over one of these up-to-the-minute cities where the Chamber of Commerce, the Rotary Club, the city government and public utilities all get together to "boost and build."

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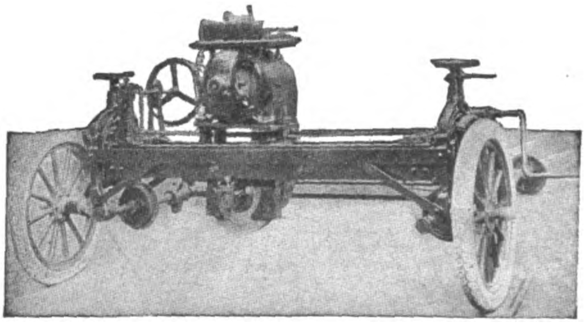

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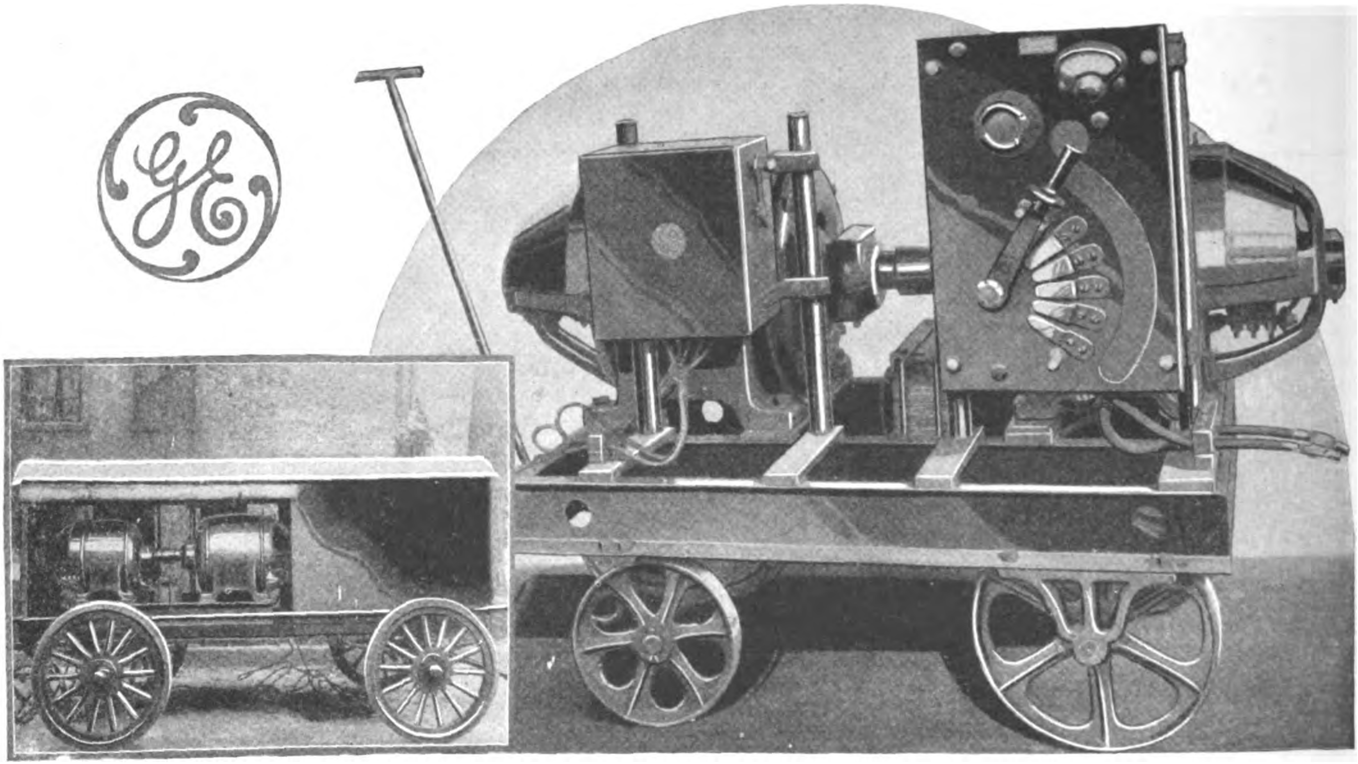

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New York, Saturday, July 21, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 62
Number 3

The Master Mechanic of the Future —and His Job

IF ELECTRIC railways are to give the public the attractive transportation service that will get business under modern competitive conditions, they must have good, well-maintained rolling stock. This is axiomatic, you say? Maybe so, but that does not mean that the fact is fully appreciated in practice. Just as important as buying good cars is having the right kind of men in the mechanical department.

The department that is responsible for the quality and condition of cars is extremely important. These are the tools of service. They must be good. To keep them so requires brains and skill of high order. But in reality the mechanical department, speaking broadly, is not given the executive consideration that its essential character warrants. The head of the department is not chosen with the care, nor paid the salary, that will insure the right caliber of master mechanic or, more properly, superintendent of equipment.

One of the prime considerations is to get a man who will be bigger than his job. He should be one who will not be satisfied merely to keep the equipment at some previously determined standard of repair, but will furnish the leading thought on the whole subject of rolling stock. To the extent to which he is supported he will insure the use of the most appropriate cars that the art affords.

That the situation thus pictured is worthy of attention is indicated by the statement to the writer, by the manager of an important railway, that the place of the master mechanic is one of the most difficult to fill at the salary that can be paid. This indicates that the supply of well-qualified men is not sufficient, or that the salaries offered are not attractive, or both. Another critic of the present situation complains that as compared with manufacturing methods electric railway shop practice is many years behind.

If a given railway is a back number, and is sooner or later to be replaced by other means of getting about, it does not matter much what is done in the shops or elsewhere. But if it has a definite place in the local transportation field, then it is high time to encourage the high-grade men now in the mechanical department and to lay plans to improve future quality by bringing in men who are worthy of training for high places in the department. In fact, the quality of maintenance work is one of the important factors that will determine whether or not some smaller railways are going to continue or go out of business. These men must be practical, of course, but they need vision and executive ability more than manual skill with tools. In fact, a man may be an excellent "master mechanic" without being a mechanic at all, in the usual sense of the term.

In this outline of the duty of the management toward the shops it is not meant to imply that the master mechanic himself is doing all that he could to remedy the situation; but that is another story. Both must realize that it is up to them to improve conditions. Selection of better men and payment of salaries sufficient to get and hold them is the task of the management. If you, Mr. Manager, don't believe it, make a new research on your own property and see if your shop methods meet 1923, rather than 1893, standards. We have a word also for the shop man, but will whisper it to him when you're not around.

Cleanliness of the Shop Premises Is a Profitable Virtue

ONE of the greatest hazards from the fire insurance standpoint in a railway repair shop or carhouse is the refuse which is apt to accumulate in corners, under machinery, between pits and in other out of the way places. There is so much that is inflammable about a car body and in the material, like oil, paint and varnish, used in and about a carhouse and shop that when a fire once gets well started it is apt to spread. Hence an even greater effort should be made to prevent a fire starting than to put it out when it does begin.

Of course, most of the buildings recently erected for the repair and storage of cars have been constructed to reduce fire hazards, but there is far more connected with this object than the form of construction used. Of almost, if not quite, as great importance is the kind of "housekeeping" practiced in the shop or carhouse. In fact, this is one of the major matters considered when fire underwriters establish their premium rates, so that the repair shop or carhouse foreman who looks out for this matter and impresses the need of it upon his men may often be the means of saving a large sum for his company. Here are some of the simple rules that such a foreman can enforce.

He can see that all combustible refuse is put in waste cans and that these are emptied daily, that dirt in general does not collect in obscure places, that men keep their shop clothing in their lockers when they leave for the night and that discarded clothing is taken away, that they do not hang clothing or other things on electric wires or fixtures, that the building wiring in general is maintained in good electrical condition, that material does not lean against it and that the wiring is not in a position where it is subject to mechanical injury, that the drip from oil barrels and oil tanks is caught before it can fall on the floor, that empty oil barrels are promptly removed, and in general that the premises are kept tidy with a place for everything and everything in its place.

There is much, of course, in the way of fire protection which can economically be installed with the expenditure of money, but there are also many things, like those mentioned above, which cost nothing but a little care and consideration, and the returns from this expenditure are enormous.

High Labor Cost Stimulates Development of Maintenance Economics

THERE was a time when much of a mechanic's energy was spent in doing things that required little or no mental effort. This is still true to some extent, but much less than formerly. The improvement is due to the use of good hoisting and transporting machinery; to the routing of work so as to eliminate lost motion; to the application of machine tools properly adapted to the operation to be performed; to the keeping of good cost records; to the exchange of information among railway properties, which results in higher standards of performance; to the wonderful development in the art of reclamation, and, last, but in many ways most important, to the spread of the real educational spirit throughout the shop organization.

The best and therefore most highly paid physician is he who keeps his clients well. By analogy the best master mechanic is the one who keeps cars out of the shop rather than the one who repairs them quickly when they are pulled in. This means two things: First, a thorough knowledge of the causes which make repair work necessary, and, second, the best possible facilities for doing first-class maintenance work. Managers seem to be waking up to the fact that a definite part of their success depends on having a first-class shop, run in accordance with modern methods. Otherwise maintenance costs would be much higher than they are.

It follows, then, that the increasing difficulty which electric railway master mechanics are having in getting reliable craftsmen for the several shop departments is not without compensating advantages. It is forcing attention to shop economics as nothing else could possibly do. In other words, as expert labor is now recognized as a commodity of relatively high unit cost, every effort is being made to utilize it effectively. The result is improvement all along the line. Everything that can be done to substitute machine work for hand work is a matter of great interest. As far as possible manual operations are being confined to special, rather than routine work.

Cultivate the Habit of Observation

THE human mind frequently fails to assimilate things that are seen by the eye. Whether the hour of six is indicated on the face of his watch by a Roman or an Arabic numeral is a question which many a man cannot correctly answer. We often find it extremely difficult to describe objects with which we are familiar from daily observation. There is, of course, a great difference between individuals in this respect; details which make a deep impression upon one man are entirely overlooked by another.

The trainmen of an electric railway can materially assist in the maintenance of equipment by observing and reporting defects. The average motorman or conductor, however, is not as useful in this respect as he might be. A minor defect is often allowed to continue unknown to the mechanical department until it grows into a major defect which cripples the car. Frequently this could be avoided. The time to fix a hot journal, for instance, is when it first begins to squeal, rather than after the waste is on fire and the babbitt melted, but in order to notice such things at the beginning, trainmen must have the habit of observation.

In a general way, it may be said that keenness of observation depends directly upon the interest taken by the individual. An aviator notices the slightest variation from the rhythmic hum of his machine, because his life depends upon it. The driver of an automobile soon notices the slightest knocking of his engine. But the operator of a railway car often goes blithely along heedless of clatter and bang, or a dragging sensation, that ought to tell him there is something wrong.

If the trainmen can be persuaded to watch with a keen eye for the slightest defects in the equipment, to develop good "mechanical sense" so to speak, they can render great assistance to the mechanical department. They are in a better position to observe such things than are the shopmen, and the men themselves, the company and the public will all benefit by catching car ailments at the first indication of trouble.

Increased Life Obtained Justifies Welding of Manganese Steel

MANGANESE steel is used quite generally in special trackwork construction at points where traffic is heavy. At such points frequent relaying or replacement is costly and it is therefore quite essential to prolong the life of the trackwork as much as possible.

Building up and patching manganese special trackwork by welding has been used to a considerable extent for the past ten years. The results obtained are not of a permanent character, but they do prolong the life of the various pieces and so extend the time when entire renewal is necessary. Most track engineers feel that if the life of the trackwork is extended two or three years the expense of welding is justified, and some say that even one year of additional service will justify welding.

The constant pounding produced by the wheels of rolling stock on the manganese frogs at crossings causes low spots. The metal becomes fatigued, and sagging results. The building up of these points and grinding smooth gives a new surface. While not as good as the original, still with proper cohesion of the added metal a surface is obtained that may last for several years.

Manufacturers of special trackwork have argued against such repairs, as they do not produce a permanent remedy, and must be considered as a rather temporary expedient. The objection has been put forward that the physical properties of the manganese are altered by welding, but from the maintenance man's point of view this makes no great practical difference, since if welding repairs were not made the piece would have to be replaced anyway. The steel in close proximity to the weld no doubt is changed in character. General observation, however, indicates that this change is not detrimental, as the manganese parts after welding wear well, and in most cases give from two to five years additional service.

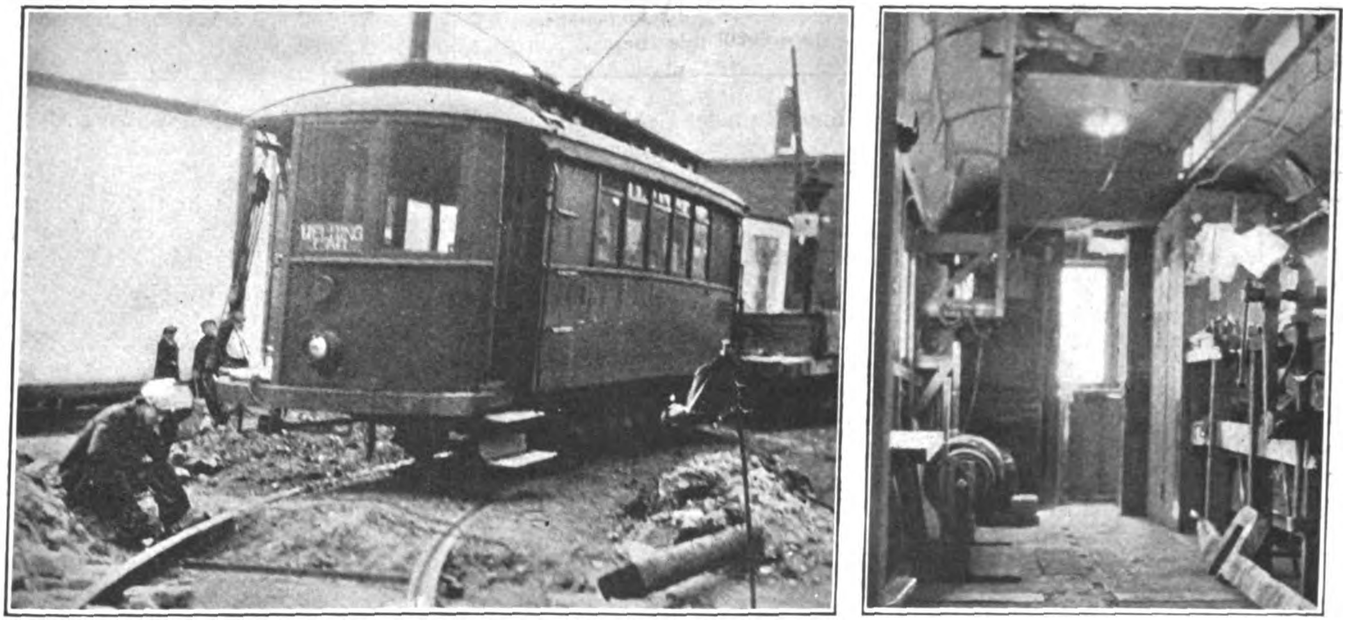
The various methods used have not produced manganese steel of the same character as that used in the original switch or frog. The heat treatment used in the original process cannot be duplicated in welds made in the open under service conditions. The additional service obtained in most cases, however, proves that real economy results from welding, and the increased life obtained is satisfactory.

An Electric Welding Car in St. John, N. B.

Standard Welding Equipment Has Been Mounted in a Motor Car to Provide a Portable Unit Suitable for Track or Shop Use

By C. L. Bcxter
Chief Welder New Brunswick Power Company, St. John, N. B.

IN ST. JOHN, N. B., we began the use of the electric welder in the year 1917. Until last fall the dynamotor used for supplying the welding current was mounted in the original cart, and was used for trackwork almost exclusively, being hauled from one location to another by a team, a slow process when jobs are small and far apart. Due to switchboard and commutation troubles the machine did not render very good service for this work, and it was found unsatisfactory in the shop.



At Left, Welding on Dead Track in Daytime. At Right, Inside View of Car, Showing Armature in Position for Welding

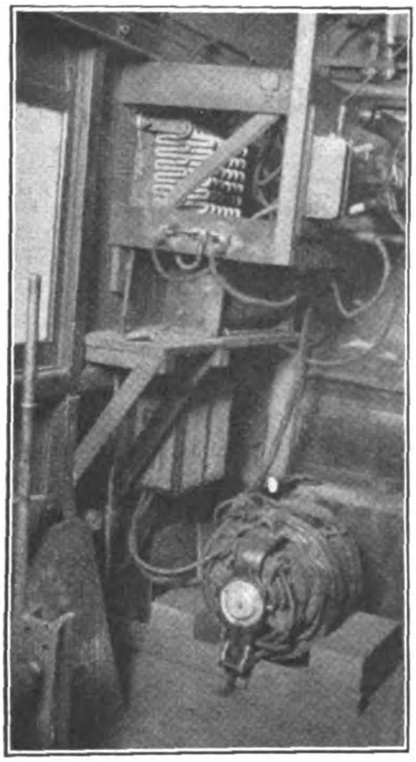
Being confronted with the alternatives of either making this machine operate efficiently or purchasing a new outfit, and desiring better welding facilities at the repair shop, we conceived the idea of changing the design of the machine so that it would be mounted complete in a car, thus providing a portable welding room suitable either for track or shop work. This idea has been worked out very satisfactorily for use on this property.

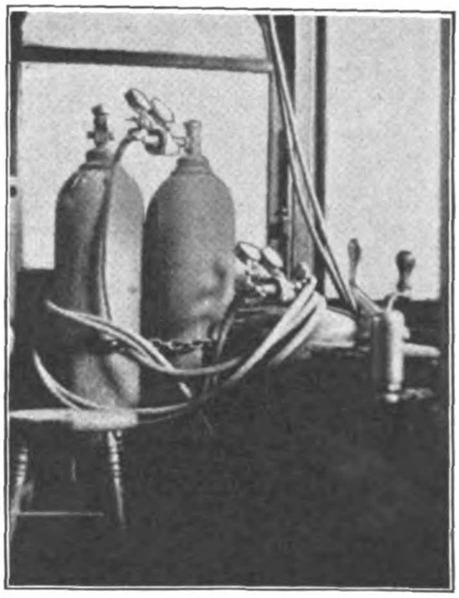
We used an old single-truck car which had originally been an open car. This was sheathed up on the sides and windows were fitted. A bench was built on one side running the entire length of the car except for a space at one end occupied by a supply cupboard and a clothes locker. Spaces were partitioned off beneath the bench for the storage of helmets, welding rods, carbons, and other supplies, and drawers were provided for tools.

Two cross beams were installed overhead to accommodate a block and tackle, and a small roller dolly was constructed for use in running heavy articles into the car. The front vestibule of the car was completely inclosed, and the rear one inclosed for about two-thirds its width, thus leaving a small open deck over which rails, truck frames and other long articles could be put directly into the car. A davit was installed at the rear of the car body, carrying a hoist, and arranged to swing over the side. Heavy articles are lifted easily and swung inside onto the dolly, on which they are pushed forward to the proper place for welding. Being an open car originally the floor is level from end to end, facilitating this method of loading.

Three steel frames were built, one for axles, one for armatures, and one of adjustable length for smaller shafts. These were all fitted with lathe centers to support the object while being welded, permitting easy turning. All three frames may be removed from the car and stored outside when desired. The frame for supporting armatures is so arranged that it will fall forward with the centers on a level with the shaft of an armature resting on the dolly. The centers are then screwed into place, after which the whole apparatus is easily swung back to the normal position, carrying the armature with it, ready for welding. Axles are placed in their frame by means of a hoist.

The welding machine is mounted on the floor in the front left-hand corner of the car, with a switchboard of our own design mounted above it. Both the motor and the generator circuits are grounded to the car truck, the generator also being grounded to four iron floor plates, one bench plate, and a vise. This is to obviate the use of a ground cable, as the articles being welded make contact through one or another of these devices. In addition to this, floor traps may be lifted and work



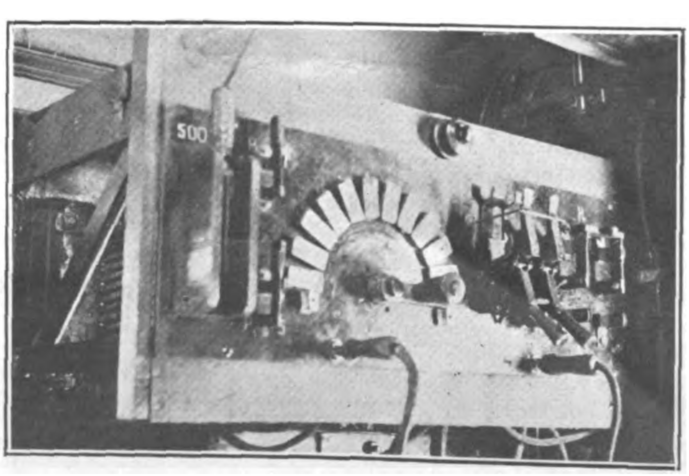


At Left, Welding Unit and Switchboard. In Center, Acetylene Outfit Mounted on Platform. At Right, Door for Allowing Insertion of Long Objects Into Car

lowered through to the track level, grounding against the car axle, if desired. The armature and axle frames, when in use, rest on a floor plate for grounding. A ground cable is provided for use in grounding articles outside the car, and which are not in contact with the track, which of course is in direct connection with the car truck.

A welding cable is carried along the wall on hooks in such a manner that it is convenient for use at any point in the car. Another cable is arranged similarly, to permit changing from metallic to carbon arc without changing the electrode holders. An extra welding cable is kept on the front bulkhead for outside use, this cable being plugged into outside receptacles, of which one is located at each end of the car. These are connected to the machine through a single-pole double-throw switch which permits ready reversal of the polarity.

A "surge control" unit obtained from the manufacturer of the machine, a new bank of grids and a new switchboard were installed, resulting in the perfect operation of the machine. The surge control consists of a bank of resistance connected to the line switch on one side and to the armature on the other. The 500-volt current is taken from the car trolley to a line switch near the ceiling. This switch is opened when the machine is shut down for any length of time or when the car is running. From this switch the current goes to a second line switch on the board, then to the fuse, the surge control, and the machine. A cord connected to this second switch runs through the car in a manner similar to a bell cord, so that the machine may be shut down from any point in the car.



Close-Up View of Switchboard

The switchboard is mounted vertically above the dynamotor. It carries the second line switch, two single-pole single-throw switches, one of which parallels five grids and the other six grids in the welding resistance. These are used principally in carbon arc work. A twelve-point rheostat dial is connected with the welding resistance. The starting resistance is controlled by the original breaker switches. These were at first mounted horizontally, and were responsible for part of our trouble. They have been remounted in a vertical position and are now entirely satisfactory. A double-pole double-throw switch controls the stabilizer resistance, increasing or decreasing it, as designed by the manufacturer. The stabilizer itself, together with the welding resistance, is mounted behind the switchboard. The stabilizer is short-circuited by a single-pole single-throw switch on the board, while the carbon arc is in use, the switch being open for metallic arc work. A bell is connected to the breaker switches so as to ring if the breakers open while the machine is in operation. This feature is of use when work is going on outside the car. There are two cable receptacles on the board, one for the welding cable and the other for the ground connections, these cables being reversed to change the polarity of the floor plates.

An oxyacetylene outfit is carried on the front platform at one side of the controller, where it readily may be removed from the car for use when needed.

We have no car traffic on our lines between the hours of 12:30 and 5:45 a.m. All our work on track is done within these hours, except on dead track under construction and surface work, which occasionally is done during the daytime. Light is provided by means of a bank of lamps outside the car, and a single-lamp extension cable which may be plugged into an outlet outside of the vestibule. This outlet is connected to a two-way switch which cuts out one inside lamp when the extension is to be used.

The trackwork done consists of joint welding, bonding, some surface work, building up of broken rail heads, repair of special work, and all acetylene work. The car is run to the job, being timed to arrive as soon as the last regular car has passed, and leaves before the first one arrives in the morning. Two men compose the crew, each man being able to handle the machine, the oxyacetylene outfit, and to operate the car. In winter weather they work in turns, one welding outside while the other is warming up. When the oxyacetylene set is being used, the second man does shop welding, thus making a saving of time.

By Working at Night Welder Is Used Twelve to Fourteen Hours Daily

Both men work from 12 o'clock midnight to 6 a.m. on trackwork in the summer, one putting in from three to four hours additional in the morning on shop work, the other spending a like amount of time in the afternoon. This gives us twelve to fourteen hours use of the machine each day. Enough work is available in the winter in the way of handling maintenance and in preparing work for the welder to keep the second man busy, it being necessary at times to stagger their hours in order to obtain a longer day for the machine so as to keep up with the work.

The shop work we do generally consists of truck frames, armature shafts, brake gear, motor cases, gear cases, rebuilding trolley bases, repair of journal boxes, tools of all sorts, automobile parts, power-house work, machine parts, etc., including the welding of brass and cast iron. The acetylene is used almost entirely for preparing for welds and cutting of rails, bolts, rivets and scrap.

Trackwork is performed more efficiently because of the constant trolley voltage available at night and the absence of traffic interruptions. We find that very nearly as much work can be done at night in five or five and one-half hours as can be done in nine hours in the daytime, and what is done is done better. Shop work may be carried on inside the car if trackwork is interrupted by rain, and little time is lost in getting from one job to another, work being done in widely separated places in one night. When necessary, 30-ft. rails may be carried along to the job in the car along with a shop-full of tools, the welding machine, the acetylene outfit and the track gang. Welding is done directly on other cars by spotting the welding car on an adjacent track or the same one, thus obviating dismantling the car for welding. Of course, this can only be done occasionally.

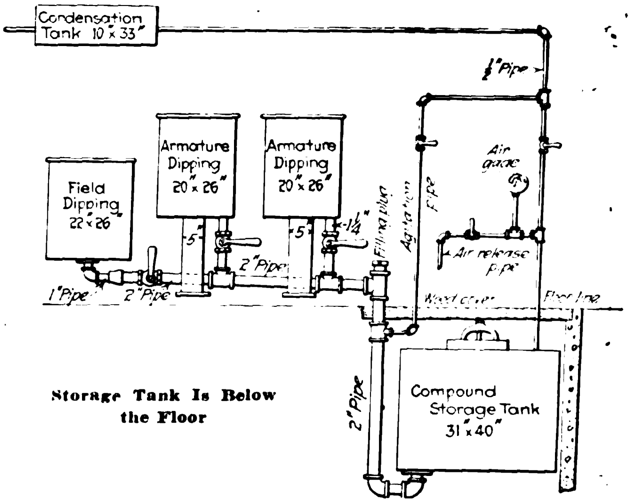
By arranging the welding unit in this form so that it is flexible and mobile we have made it do both for shop and track, thus avoiding the investment in a second unit which probably would lie idle most of the winter. The original outfit was supplied by the Rail Welding & Bonding Company, which also furnished the surge control resistance.

The results obtained in St. John have fully justified the construction of the outfit. Its flexibility permits us to use it for many jobs at widely separated points where welding would not be attempted if the ordinary outfit had to be hauled around.

New Armature Dipping Tanks at Erie Filled by Air Pressure

Apparatus Is So Designed that an Extremely Small Quantity of Compound Is Required—The Fire Hazard Is Reduced and the Speed of Operation Is Increased

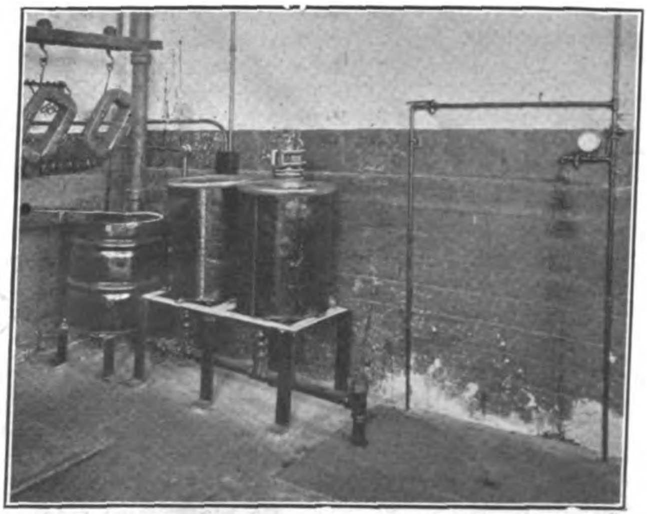
THE installation of a new armature dipping and baking plant has just been completed at the East Twelfth Street shops of the Buffalo & Lake Erie Traction Company. For convenience in handling the varnishing compound and economy in the quantity of compound used, the method followed in these shops is a distinct improvement over common practice. The dipping tanks and the general layout were designed by P. J. Wood, master mechanic of the company, and the ovens are of the standard type manufactured by the Westinghouse Company.



Storage Tank Is Below the Floor

The varnishing compound is kept in a small underground tank of 2-bbl. capacity. Near by are two vertical cylindrical tanks for armature dipping and a rectangular vat for the treatment of field coils. All the dipping tanks have direct pipe connection with the tank of compound, so that filling and emptying is merely a matter of turning a few valves.

An armature is placed with axis vertical and commutator end up in the cylindrical tank, which is 16 in.



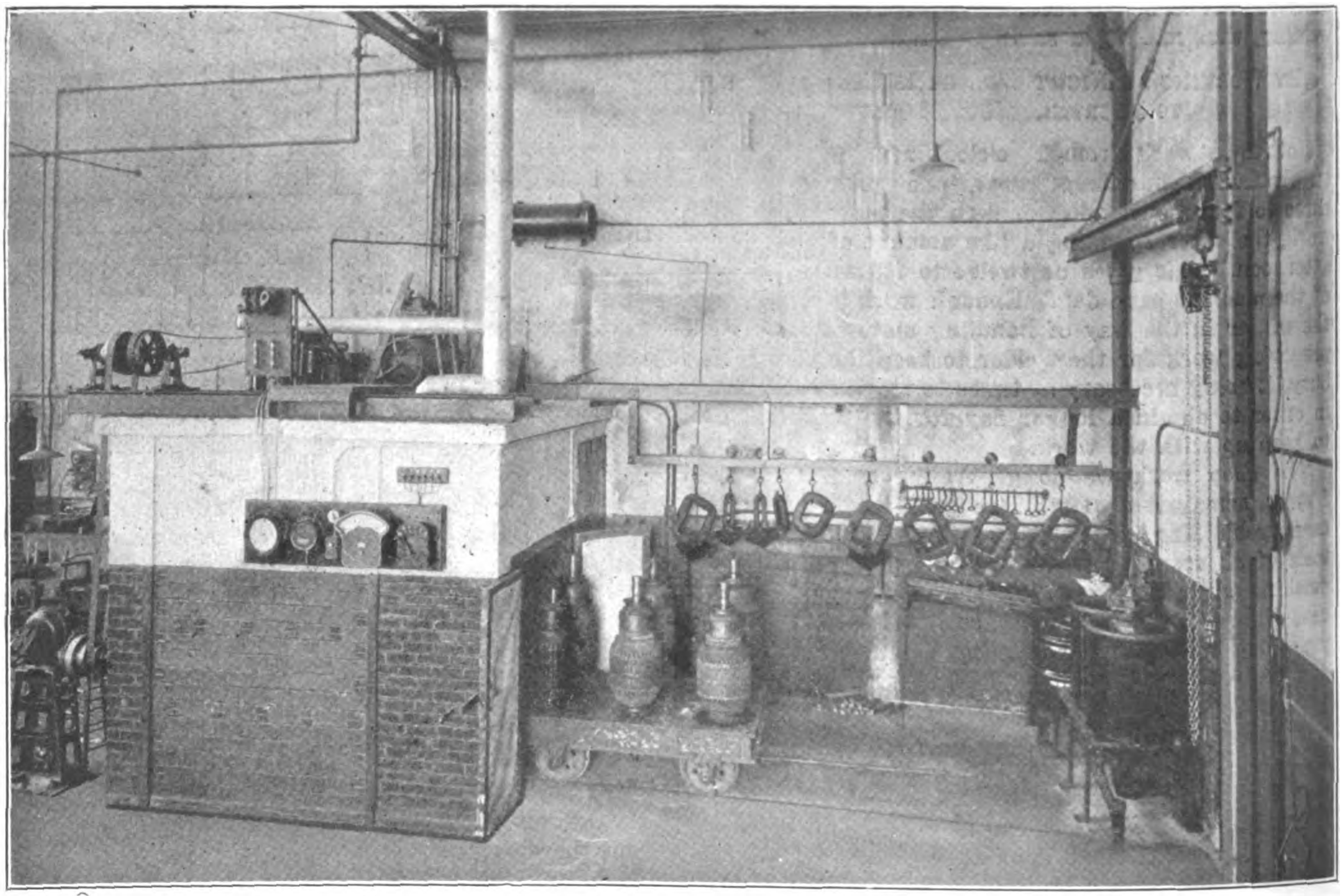
The Compound Is Forced Up from a Tank Below the Floor by Air Pressure deep and has a diameter of 20 in. The pinion end extends downward into an opening especially provided for it, and a felt gasket on which the hood rests prevents varnish from running down onto the pinion.

The compound is admitted to the body of the tank at the bottom by an inlet pipe which comes from the main supply. Varnish is allowed to flow in until the level in the dipping tank has risen high enough to cover all parts to be treated, but the valve is closed before the varnish reaches the commutator. It requires only a small quantity of compound completely to fill the dipping tank because the armature itself occupies the greater part of the space. Thus economy is achieved in the use of varnish, the fire hazard is reduced, and the speed of the operation is improved.

The supply tank has been placed underground, and compressed air is used to force the varnish through the pipes. The main air pressure, controlled by a convenient valve, is admitted to the underground tank through the top at one end. At the bottom at the opposite end is an outlet pipe which connects with each of the dipping tanks. When the valve is opened, admitting air pressure into the supply tank, the compound is forced out at the bottom and up in the inlet pipes of the various dipping tanks. By manipulation of individual valves as much varnish as desired can be admitted to each tank.

After the filling process is ended, the main air pressure is shut off from the supply tank, and when it is eventually desired to empty a dipping tank, the air vent of the supply tank is opened and the compound flows back again, until the dipping tank has been drained. This air vent serves another useful purpose also, as it is sometimes desired to agitate the varnish stored in the supply tank. To do this the vent is opened and air is admitted through a special agitator pipe leading to the bottom of the tank. The air introduced here rises through the varnish and escapes through the vent, stirring up the varnish.

The comparatively small amount of compound required completely to surround an armature in the dipping tank makes possible an unusual heating method, in which the armatures themselves are heated, instead of the varnish, as is usually the case. A short, straight section of narrow-gage track connects the dipping tanks with the baking oven. On this track is a little car arranged to hold six armatures. The car is loaded and pushed into the oven, where its load is thoroughly heated. Then it is pulled back to a position where a jib crane can lift out armatures and put them in the dipping tanks. A hot armature is placed in each tank, which is immediately filled with varnish.



Field Coils Are Carried by Monorail Into the Baking Oven

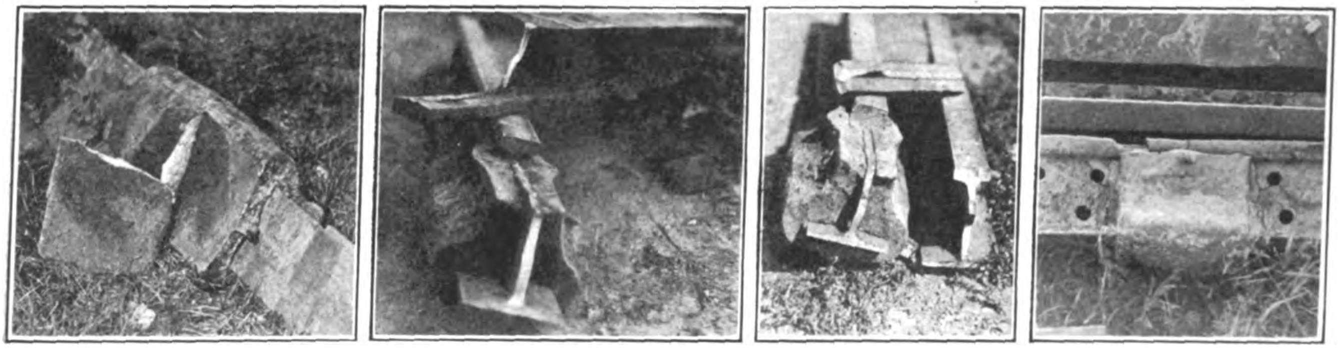
The quantity of heat absorbed by the armature while in the baking oven is more than sufficient to raise the temperature of the surrounding varnish to the required degree. Armatures are allowed to remain in the dipping tanks until all bubbling has ceased, which usually takes about ten minutes. The first two are then removed from the tanks and returned to their places on the little car. Two more pairs are treated in the same way, and then the car is pushed back into the oven while the armatures are baked.

A rectangular dipping tank for field coils is located beside the two cylindrical tanks and is filled and emptied in the same manner. For their transportation to and from the oven a continuous overhead monorail track has been constructed. The field coils are suspended from small trolleys which are pushed along the monorail into the oven, around a loop inside, and out again when the baking has been completed.

Rail Joint Tests on the Detroit Municipal Railway

The Department of Street Railways in Detroit Has Conducted an Extended Series of Tests on Seam-Welded Rail Joints—Full Particulars Are Given, with Comments on a Large Number of Cast-Welded Joints Removed During Track Rehabilitation

DURING the last two years the electrical department of the Detroit municipal railway, under the direction of H. M. Gould, electrical engineer, has made an extensive study of the strength of seam-welded rail joints and incidentally of the mechanical and chemical structure of cast-welded joints. The investigation of the qualities of seam-welded joints was conducted because this joint had been adopted as standard for all new work by the Department of Street Railways of the city of Detroit. The study of the cast-welded joint was made because a large number of these joints were formerly used on the Detroit system and are being taken up as the city track is being rehabilitated or renewed by the Department of Street Railways.



These Types of Failure Are Common in the Cast-Welded Joints Removed from Track in Detroit

The installation of rail joints in Detroit has been assigned to the electrical department partly because of the important function which the joint has in the return circuit and partly because the problems of electrical welding would naturally be assigned to this department. The study of the cast-welded joints removed was undertaken by this department as a matter of scientific interest.

Of all the cities which employed cast welding for rail joints when that method was followed, the process was probably most extensively used in Detroit, Minneapolis, Milwaukee and Brooklyn. It was thought, therefore, that the track rehabilitation at Detroit afforded an excellent opportunity for a comprehensive inventory of the cast-welding process for rail joints, at least as employed in that city.

TESTS WITH ELECTRICALLY WELDED JOINTS

The standard type of track construction in Detroit under the present management, as described in the issue of this paper for July 23, 1921, is monolithic, except at special trackwork. The present standard for construction calls for International twin steel ties 5 ft. 6 in. average centers; the standard A.R.A. Type A 100-lb. plain girder rail; seam-welded joints; and the base of the rail welded to the tie at every joint and at every third intervening tie. The first track laid, for about 60 miles, was with 91-lb. 7-in. T-rail. The Street Railway Department knew what might be expected from concrete, rails and ties, but the quality of electrically welded joints was largely unknown. Hence, beginning about October, 1920, when an extensive construction and rehabilitation program was being planned, a series of tests on rail joints, seam-welded in different ways, was begun. The actual tests were made at the Perry Testing Laboratory in Detroit, under the direction of the electrical department.

In the various forms of joints tested, with two exceptions, the metallic arc was used. One reason for this was that at the time the trackwork in Detroit was done, practically all of the joint welding was on new tracks where no trolley current was available. The metallic arc requires about 150 amp. at 30 volts, and the carbon arc approximately 300 amp. at 60 volts, and as at that time there were no welding machines on the market that would take care of two carbon arcs, the metallic arc was adopted. The welder used was the two-arc gasoline-driven welding machine of the Wilson Welder & Metals Company, mounted on a track lorry. Altogether, tests have been made on forty different types of welded joints. As the tests were begun with the 7-in. 91-lb. rail they were continued with that rail to have the results comparable, though a change has been made in the company's standard as described. The essential data obtained from each test are given in the accompanying drawings. The following comments give further particulars of the tests and present the opinion of the electrical department on the results shown.

PARTICULARS OF INDIVIDUAL TESTS

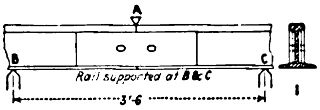
Case 1 was a joint set up with 20-in. plates and two ⅞-in. bolts, but not welded. This test was made to determine the strength given to the joint by two bolts without any welding.

Case 2 was a joint set up in a similar manner with four bolts and no welding. The results of Cases 1 and 2 were about of the same order.

Case 3 was seam welded for the full length of the

Case 1
No Welding

91 lb. 7 in. tee rail, ¾ in. x 20 in. plate, two ⅞ in. bolts.

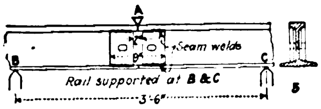


Load Applied At "A"	Deflection in in.
25,000 lb.	.0938
40,000 lb.	.2187
50,000 lb.	.4375
75,000 lb.	1.3437
90,000 lb.	2.2187
99,200 lb.	See below

At 99,200 lb. test was discontinued on account of bottom of rail touching base of testing machine. Small crack in plate near bolt hole. Plate and rail badly bent, bolt head slightly sheared.

Case 5
Electric Arc Weld

91 lb. 7 in. tee rail, ¾ in x 9 in. plate, two ⅞ in. bolts, plates seam welded full length except for 2 in. lap at joint.

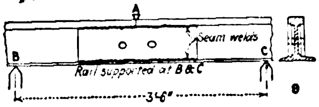


Load Applied At "A"	Deflection in in.
25,000 lb.	.3063
40,850 lb.	3.000

At 35,900 lb. plate distorted and pulled away from welds on ends. At 40,850 lb. weld failed completely and rails spread about 2½ in. at bottom.

Case 9
Electric Arc Weld

91 lb. 7 in. tee rail, ¾ in. x 20 in. plate, two ⅞ in. bolts, plates seam welded full length.

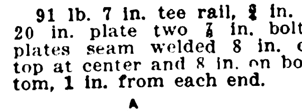


Load Applied At "A"	Deflection in in.
25,000 lb.	.0625
40,000 lb.	.0937
50,000 lb.	.2812
75,000 lb.	.7500
90,000 lb.	.9688
114,350 lb.	See below

Both plates cracked at 114,350 lb., bottom welds on both sides sheared off about one-third of way from joint. Top welds let go near joint. Welds held well until plates broke.

Case 13
Electric Arc Weld

91 lb. 7 in. tee rail, ¾ in. x 20 in. plate two ⅞ in. bolts, plates seam welded 8 in. on top at center and 8 in. on bottom, 1 in. from each end.

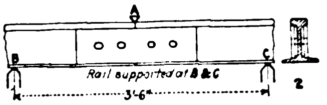


Load Applied At "A"	Deflection in in.
25,000 lb.	.053
50,000 lb.	.132
60,000 lb.	.215
70,000 lb.	.346
80,000 lb.	.553
90,000 lb.	.909
96,850 lb.	1.062
98,156 lb.	Complete failure

Welds started to break on top and bottom at 90,000 lb. Fish plates broke at 92,000 lb.

Case 2
No Welding

91 lb. 7 in. tee rail, ¾ in. x 20 in. plate, four ⅞ in. bolts.

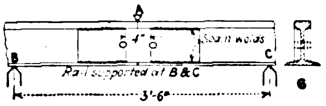


Load Applied At "A"	Deflection in. in.
25,000 lb.	.0625
40,000 lb.	.1250
50,000 lb.	.2188
75,000 lb.	1.3125
90,000 lb.	2.4063
96,350 lb.	See below

At 96,350 lb. test was discontinued on account of bottom of rail touching base of testing machine. Small crack in plate near bolt hole. Plate and rail badly bent. Bolts O.K.

Case 6
Electric Arc Weld

91 lb. 7 in. tee rail, ¾ in. x 20 in. plate, two ⅞ in. bolts, plates seam welded full length except for 4 in. lap at joint.

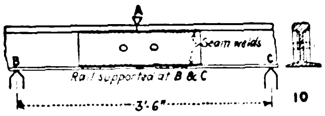


Load Applied At "A"	Deflection in in.
25,000 lb.	.125
50,000 lb.	.375
85,330 lb.	See below

Plate broke at 85,330 lb. test continued until second plate broke.

Case 10
Acetylene Weld

91 lb. 7 in. tee rail, ¾ in. x 20 in. plate, two ⅞ in. bolts, plates seam welded full length acetylene weld made by Oxweld Acetylene Co. of Detroit. Rails preheated before welding.

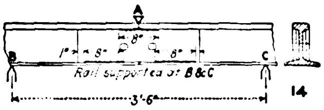


Load Applied At "A"	Deflection in in.
70,000 lb.	.187
75,000 lb.	.219
80,000 lb.	.266
90,000 lb.	.296
117,000 lb.	See below

Probable yield point 76,870 lb. Plate broke at 117,000 lb. weld intact.

Case 14
Electric Arc Weld

91 lb. 7 in. tee rail, ¾ in x 20 in. plate, two ⅞ in. bolts, plates seam welded 8 in. on top at center and 8 in. on bottom, 1 in. from each end.



Load Applied At "A"	Deflection in in.
25,000 lb.	.0312
50,000 lb.	.0937
75,000 lb.	.3125
91,250 lb.	See below

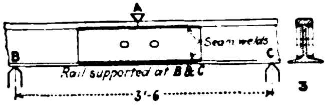
One bolt sheared, weld broke on top and bottom on both sides of joint. Plate broke on one side.

Records of Detroit Joint Tests, Cases 1 to 16 Inclusive

These include tests of one acetylene weld, one thermit weld, eleven electric-arc welds, two splice-bar joints and one continuous rail.

Case 3
Electric Arc Weld

91 lb. 7 in. tee rail, ¾ in. x 20 in. plate, two ⅞ in. bolts upper and lower edges of plate were scarfed to 45 deg. and then seam welded full length.

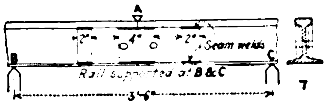


Load Applied At "A"	Deflection in in.
70,000 lb.	.4375
75,000 lb.	.50

Plates cracked from bottom scarfing. Plates split entirely across at 75,000 lb.

Case 7
Electric Arc Weld

91 lb. 7 in. tee rail, ¾ in. x 20 in. plate, two ⅞ in. bolts, plates seam welded 2 in. at each end and 4 in. at joint.

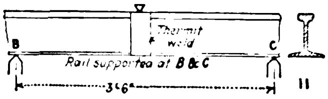


Load Applied At "A"	Deflection in in.
40,000 lb.	.0625
50,000 lb.	.1250
60,000 lb.	.2187
75,000 lb.	.3437
97,750 lb.	See below

Both plates cracked at 97,750 lb. Bottom center welds sheared off. One end weld on each fish plate intact; all others started to shear off. All welds stood up in good shape until plate broke.

Case 11
Thermit Weld

91 lb. 7 in. tee rail, no. plate. Thermit weld made by Metal & Thermit Corporation Rail heated before welding.

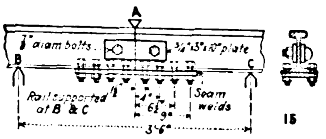


Load Applied At "A"	Deflection in in.
75,000 lb.	.125
80,000 lb.	.125
90,000 lb.	.141
100,000 lb.	.157
110,000 lb.	.188
120,000 lb.	.203
130,000 lb.	.250

Probable yield point 127,500 lb. Ultimate strength. 203,500 lb. The "Center Punch Marks" on weld metal and rail metal indicated that the yield was taking place in the weld metal. The failure seemingly took place outside the weld.

Case 15
Electric Arc Weld

91 lb. 7 in. tee rail, ¾ in. x 3 in. x 10 in. splice bars bolted with two ⅞ in. bolts not welded. ¾ in. x 7 in. x 20 in. plate bolted to base with eight ¾ in. bolts. Plate seam welded to base of rail.

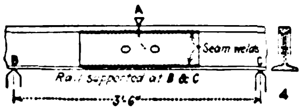


Load Applied At "A"	Deflection in in.
25,000 lb.	.0312
50,000 lb.	.0625
75,000 lb.	.1250
100,000 lb.	.1562
125,000 lb.	.2500
150,000 lb.	.4062
171,530 lb.	See below

One rail fractured through base and web in two places, fracture extended up into ball of rail, weld broke at joint, and between fracture points.

Case 4
Electric Arc Weld

91 lb. 7 in. tee rail, ¾ in. x 20 in. plate, two ⅞ in. bolts, plates seam welded full length.

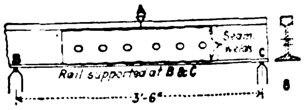


Load Applied At "A"	Deflection in in.
50,000 lb.	.125
60,000 lb.	.187
70,000 lb.	.250
75,000 lb.	.281
80,000 lb.	.312
90,000 lb.	.437
100,000 lb.	.499
110,000 lb.	.562

One plate cracked all the way across at 110,000 lb.; both plates split on continuing load. Probable elastic limit of ¾ in. plates, 78,650 lb.

Case 8
Electric Arc Weld

91 lb. 7 in. tee rail, 26 in. Cleveland plate, six ⅞ in. bolts. Plates seam welded full length.

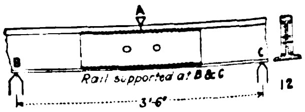


Load Applied At "A"	Deflection in in.
40,000 lb.	.1250
50,000 lb.	.2812
60,000 lb.	.3437
75,000 lb.	.4687
90,000 lb.	.6562
109,000 lb.	See below

Plates cracked at 109,000 lb. and broke at 116,250 lb. Welds on both plates, top and bottom, sheared off about half way back from joint, due to distortion of plates. Welds showed no signs of shearing until plates broke.

Case 12
Electric Arc Weld

91 lb. 7 in. tee rail, ¾ in. x 20 in. plate, two ⅞ in. bolts, plates scarfed on upper and lower edges at 55 deg. angle scarfing ½ in. wide. Plates seam welded full length.

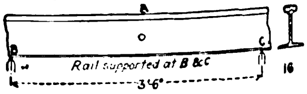


Load Applied At "A"	Deflection in in.
25,000 lb.	.023
50,000 lb.	.091
60,000 lb.	.132
70,000 lb.	.262
80,000 lb.	.406
90,000 lb.	.953
93,630 lb.	1.661
95,580 lb.	Complete failure

Weld started to break at 80,000 lb. Rail broke through flange and web at 90,000 lb. Rail showed brittle structure.

Case 16
Continuous Rail

91 lb. 7 in. tee rail, continuous rail, 1 in. tie rod hole at point of loading.

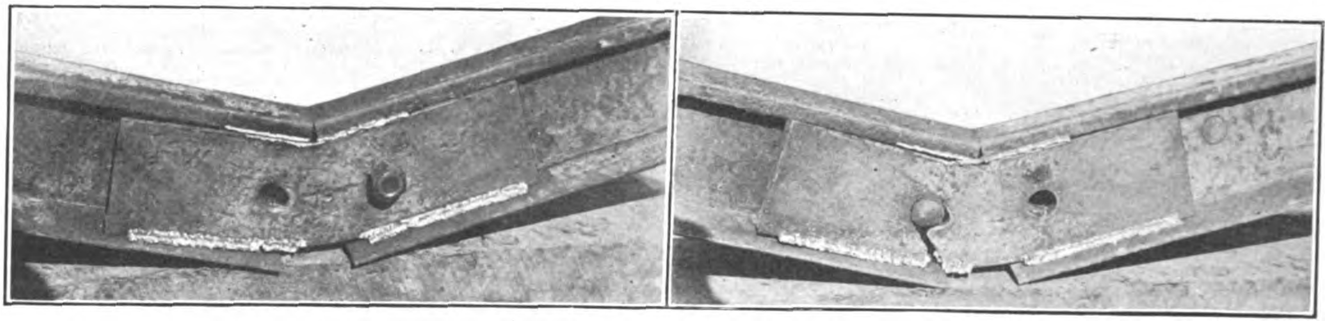


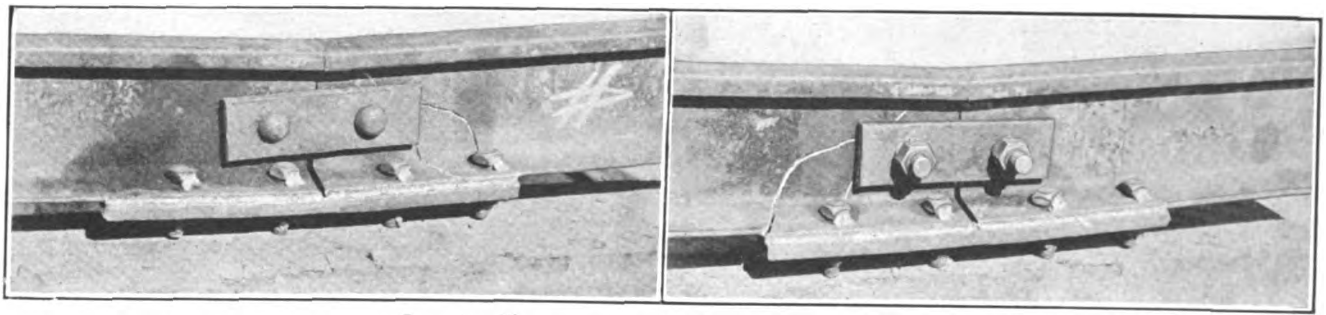
Load Applied At "A"	Deflection in in.
25,000 lb.	.0625
50,000 lb.	.0937
75,000 lb.	.1250
100,000 lb.	.1560
125,000 lb.	.1875
150,000 lb.	.3125
Prob. elas. limit	
156,000 lb.	.3437
Prob. elas. limit	
220,000 lb.	1st crack noted
241,000 lb.	2nd crack noted
245,100 lb.	Breaking strength of rail

joint plates, with the plates scarfed at a 45-deg. angle, top and bottom. This was done to determine whether a greater penetration could be procured between the plate and the rail, through the medium of scarfing the plates. In this test the plates cracked from the bottom scarfing and split entirely across at 75,000 lb. The inference drawn from this test was that when the plates were scarfed, only a knife edge of virgin metal was left in the plates at the "fishing" sections.

Case 4 was seam welded for the full length of the plate, top and bottom. This is the method followed by the Department of Street Railways in its seam-welded joints.

Case 5 used a 9-in. plate. When track construction on a large scale was begun in Detroit, difficulty was experienced in procuring all of the 20-in. plates needed, but there were on hand a large number of 9-in. plates which the track department used for lining up the track. It was thought worth while to try these plates to see if they could be satisfactorily used in permanent construction. The test showed, however, that the joint with the 9-in. plate started to give at 35,900 lb., at which pressure the plates became distorted and pulled away from the weld on the ends. The weld failed completely at 40,850 lb.


Case 8—Views of Both Sides of Joint After Failure


Case 15—Views of Both Sides of Joint After Failure

Case 6 was where 4 in. of unwelded section had been left for 2 in. on each side of the joint, top and bottom. This arrangement was tested because of a suggestion that the action of the arc, while the seam weld was being made, changed the structure of the metal in the rail. If this was so, presumably the worst effect would be right at the joint between the rails.

Case 7 was tested to determine whether it was necessary to weld the full 20 in. of the plate, or if 8 in. of weld, properly distributed along the joint, would not be sufficient to develop the full strength of the plate, and at the same time give sufficient electrical conductivity.

Case 8 was made up of a 26-in., six-bolt plate. All of the other tests, through Case 14, used a 20-in. plate, except Case 5, with a 9-in. plate, and Case 11, which was a Thermit weld. It will be noted that the welds in Case 8 sheared off due to the distortion of the plates. A comparison of the results with the 26-in. plate, 20-in. plate and 9-in. plate, indicates that the 9-in. plate is too short, and the 26-in. plate is too long. This leaves the 20-in. plate seemingly a happy medium. The distortion observed in Case 8 was in the plates.

Case 9 was a check test on Case 4.

Case 10 was a check test on Cases 9 and 4, the only difference being that in Case 9 the rail was preheated and the acetylene weld was used instead of a metallic arc.

Case 11 was a Thermit weld. This test piece was made up by the Thermit company and showed up well, but no further tests were made because the standard track construction in Detroit calls for supported joints, and the Thermit weld would mean a suspended joint.

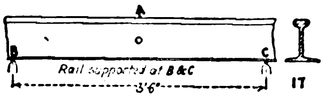
Case 12 was a full-length weld, top and bottom, with the plates scarfed 55 deg. instead of the 45 deg. shown in Case 3. The failure in Cases 12 and 3 is attributed in both instances to a lack of bearing between the plates and the rail in the "fishing" sections.

Case 13 was a test made with a joint having 8 in. of seam weld on the top seam and 16 in. on the bottom seam; the two lower seams beginning back 1 in. from the ends of the plate. This was done to find out if there was any evidence of "nicking" where the welds stop, and also to check the claim that a perfect joint should have the same deflection as the rail itself. Actually, the test showed that the two places where the weld stopped in the middle of the plate provided points for the weld to start ripping. This tendency to rip is naturally greater at the center of the plates than at the sides because there is a greater stress in testing this center point. Case 13 was checked by Case 14.

Case 15 was designed to test the theory that the use of a base plate increases the strength of the joint. A base plate welded for its full length was used, and in addition this plate was bolted to the base of the rail. The splice plates were used simply to keep the rails aligned and were not welded. It will be noted that this case shows notably greater strength than any of the joints previously tested.

Case 17
Continuous Rail

91 lb. 7 in. tee rail, continuous rail, 1 in. tie rod hole at point of loading.



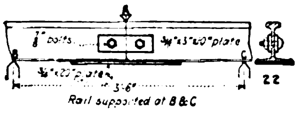
17

Load Applied At "A"	Deflection in in.
25,000 lb.	.0625
50,000 lb.	.0937
75,000 lb.	.1250
100,000 lb.	.1562
125,000 lb.	.2187
150,000 lb.	.3437
	Prob. elas. limit
166,150 lb.	.4687
	1st crack noted
184,000 lb.	
	Beam of scale dropped
226,000 lb.	2nd crack noted
229,050 lb.	See below

Rail buckled slowly in web below the ball at point of center loading and above tie rod hole and continued to twist to such an extent that the test was discontinued.

Case 22
Electric Arc Weld

91 lb. 7 in. tee rail., ¾ in. x 3 in. x 10 in. splice bars bolted with two ⅞ in. bolts, not welded. ¾ in. x 20 in. plate seam welded to base of rail.



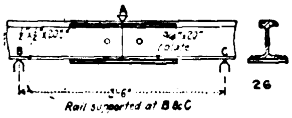
22

Load Applied At "A"	Deflection in in.
25,000 lb.	.0625
40,000 lb.	.0937
50,000 lb.	.0937
60,000 lb.	.1093
75,000 lb.	.1250
90,000 lb.	.1562
110,000 lb.	.1875
160,000 lb.	See below

Rail broke starting at the end of the seam weld on the base, welds did not break.

Case 26
Electric Arc Weld

91 lb. 7 in. tee rail, ½ in. x ½ in. x 20 in. plate welded to ball of rail, top seam only. ¾ in. x 20 in. plate seam welded to base of rail.



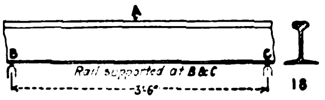
26

Load Applied At "A"	Deflection in in.
25,000 lb.	.0625
40,000 lb.	.1250
50,000 lb.	.1250
60,000 lb.	.1406
75,000 lb.	.1562
86,000 lb.	See below

Rail broke starting at the end of the seam weld on the base. Welds did not break.

Case 18
Continuous Rail

91 lb. 7 in. tee rail, continuous rail.



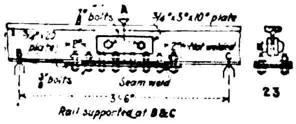
18

Load Applied At "A"	Deflection in in.
25,000 lb.	.0312
50,000 lb.	.0625
75,000 lb.	.0937
100,000 lb.	.1250
125,000 lb.	.1875
150,000 lb.	.2812
	Prob. elas. limit
175,000 lb.	.4375
213,000 lb.	1st crack noted
232,000 lb.	2nd crack noted
243,650 lb.	See below

Rail buckled in web just below the ball at the point of center loading, and continued to twist to such an extent that the test was discontinued.

Case 23
Electric Arc Weld

91 lb. 7 in. tee rail. ¾ in. x 3 in. x 10 in. splice bars bolted with two ⅞-in. bolts, not welded. ¾ in. x 20 in. plate bolted to base with eight ¾-in. bolts. Plate seam welded to base of rail except for 2 in. at each end of plate, which was not welded.



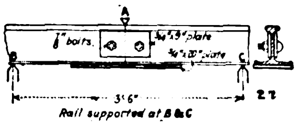
23

Load Applied At "A"	Deflection in in.
25,000 lb.	.0625
40,000 lb.	.0937
50,000 lb.	.0937
60,000 lb.	.1250
75,000 lb.	.1562
90,000 lb.	.1875
110,000 lb.	.2187
147,100 lb.	See below

Rail broke, starting at the end of the seam weld on the base. Welds did not break.

Case 27
Electric Arc Weld

91 lb. 7 in. tee rail, ¾ in. x 9 in. splice bars bolted with two ⅞ in. bolts, not welded. ¾ in. x 20 in. plate seam welded to base of rail.



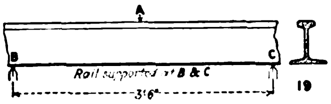
27

Load Applied At "A"	Deflection in in.
25,000 lb.	.0000
40,000 lb.	.0156
50,000 lb.	.0312
60,000 lb.	.0312
75,000 lb.	.0625
80,200 lb.	See below

Rail broke starting at the end of the seam weld on the base. Welds did not break.

Case 19
Continuous Rail

91 lb. 7 in. tee rail, continuous rail.



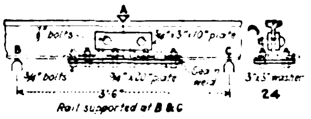
19

Load Applied At "A"	Deflection in in.
25,000 lb.	.0312
50,000 lb.	.0625
75,000 lb.	.0937
100,000 lb.	.1250
125,000 lb.	.1875
150,000 lb.	.3281
	Prob. elas. limit
175,000 lb.	.5625
229,250 lb.	See below

Rail buckled in web just below the ball at the point of center loading and continued to twist to such an extent that the test was discontinued.

Case 24
Electric Arc Weld

91 lb. 7 in. tee rail ¾ in. x 3 in x 10 in. splice bars bolted with two ⅞ in. bolts, not welded. ¾ in. x 20 in. plate bolted to base of rail with eight ¾ in. bolts, using a 3 in. x 3 in. washer with every bolt. Plate seam welded to base of rail.



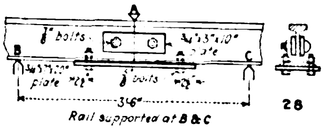
24

Load Applied At "A"	Deflection in in.
25,000 lb.	.0937
40,000 lb.	.1250
50,000 lb.	.1562
60,000 lb.	.1562
75,000 lb.	.1875
90,000 lb.	.2188
110,000 lb.	.2500
148,350 lb.	See below

Plate welded to base broke at the joint.

Case 28
Electric Arc Weld

91 lb. 7 in. tee rail. Splice bars bolted with two ⅞-in. bolts, not welded. ¾ in. x 20 in. plate seam welded to base of rail and bolted with four ⅝-in. bolts, each bolt 2½ in. from ends of plate.



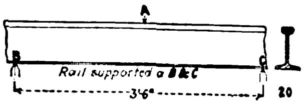
28

Load Applied At "A"	Deflection in in.
25,000 lb.	.0312
40,000 lb.	.0625
50,000 lb.	.0625
60,000 lb.	.0781
75,000 lb.	.0937
90,000 lb.	.1562
110,000 lb.	.1562
121,320 lb.	See below

Rail broke, starting at the end of the seam weld on the base. Welds did not break.

Case 20
Continuous Rail

91 lb. 7 in. tee rail, continuous rail.



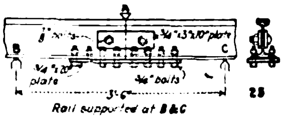
20

Load Applied At "A"	Deflection in in.
25,000 lb.	.0312
50,000 lb.	.0781
75,000 lb.	.0937
100,000 lb.	.1250
125,000 lb.	.1560
150,000 lb.	.2031
175,000 lb.	.3125
	Prob. elas. limit
258,730 lb.	See below

Rail buckled in web just below the ball at the point of center loading and continued to twist to such an extent that the test was discontinued.

Case 25

91 lb. 7 in. tee rail, ¾ in. x 3 in. x 10 in. splice bars bolted with two ⅞ in. bolts, not welded. ¾ in. x 20 in plate bolted to base of rail with eight ¾ in. bolts, not welded.



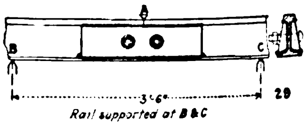
25

Load Applied At "A"	Deflection in in.
25,000 lb.	.0937
40,000 lb.	.2812
50,000 lb.	.4062
60,000 lb.	.5000
75,000 lb.	.6875
83,600 lb.	.9375
	See below

Bolts started to shear off at 83,600 lb. and continued until all bolts had sheared.

Case 29
Electric Arc Weld

91 lb. 7 in. tee rail 20 in. triangular splice bars seam welded top and bottom. Two ⅞ in. bolts spot welded.



29

Load Applied At "A"	Deflection in in.
25,000 lb.	.0312
40,000 lb.	.0312
50,000 lb.	.0312
60,000 lb.	.0312
75,000 lb.	.0625
90,000 lb.	.0937
110,000 lb.	.1093
140,520 lb.	See below

Rail broke at end of splice bars, weld did not break.

Records of Detroit Joint Tests, Cases 17 to 29 Inclusive

In these cases, tests were continued with the continuous rail and with the electric-arc weld in which a plate seam welded to the base of the rail was used. (There was no Case 21, for reasons explained in the text.)

Cases 16 to 20 inclusive show the results of transverse tests on straight rails. Cases 16 and 17 had tie-rod holes opposite the point of application of the load. All of these tests show very much higher strength than any of the joints. This seems to indicate that the welding in some way may weaken the rail.

There was no test No. 21. This number was left open for another test on a continuous rail if such a test should be considered desirable.

Case 22 was a joint with a seam-welded base plate without any bolts in the base of the rail. This was a check test on Case 15 to learn the effect of the bolts. It will be seen that in Case 15 the rail broke at 171,530 lb., and in Case 22 at 160,200 lb.

Case 23 covered a joint with a base plate bolted and welded, the weld being stopped 2 in. from the end of the plate. This was done to see whether this arrangement would stop trouble from nicking.

Case 24 covered a joint with a base plate seam-welded for its full length and bolted to the rail, but with a bevel washer under the head of the nut to distribute the strain over a greater area on the rail base.

Case 25 covered a joint made up with a base plate bolted but not welded. It will be noted that its strength is far less than when the base plate is seam welded but not bolted, as in Case 22.

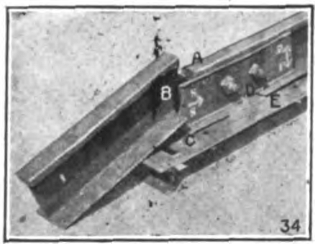
Case 26 covered a joint with the base plate welded to the base of the rail for its full length, and a guide plate welded to the head of the rail to take the place of the ordinary joint plates. In this case the rail broke, so that the real value of this construction is hardly shown.

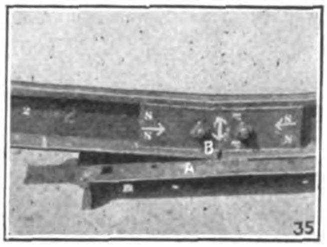
Case 27 had a seam-welded base plate with a pair of splice plates set up high to give a head support to the rail. This test was not conclusive because the rail broke at 80,200 lb.

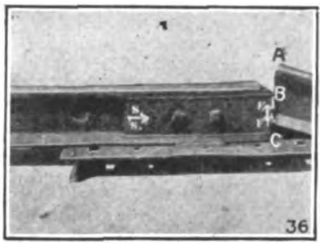
Case 28 had a seam-welded base plate with four bolts instead of the eight bolts shown in Cases 15, 23, 24 and 25.

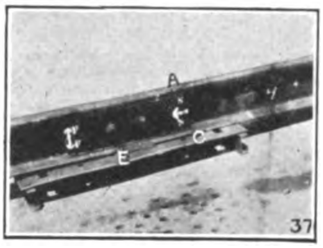
Case 29 had special solid triangular fish plates, seam welded top and bottom.

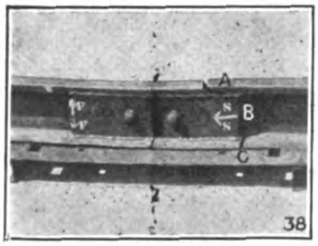
Case 30 had one-half of an International twin steel tie, seam welded to the base of the rail for its full length. The tie split entirely across at 193,800 lb.

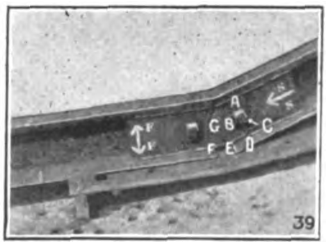


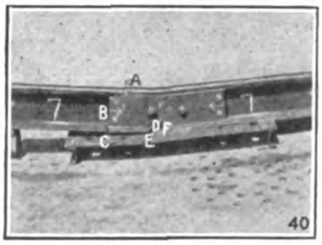


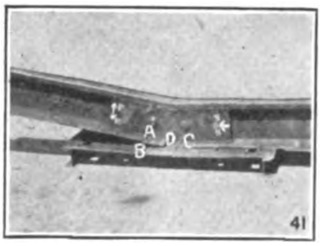












Views of Joints 34 to 41 After Failure

Cases 30 and 31, which are of the same set-up, show conclusively the effect of a properly welded base plate as compared with anything that can be done in seam welding the fishplates. These give a strength of joint practically equivalent to that of a continuous rail.

Cases 32 and 33 show joints made up of the department's standard full-length seam weld of the joint plates, and a 6-in. weld between the base of the rail and International twin tie. In both these cases the rail broke at the base, starting at the end of the weld next to the tie and extending up through the bolt hole. In both these cases it would seem that there was too great a concentration of heat at the point where the short welds stop.

It will be noticed that in most of these tests the weld showed no sign of breaking down, but in practically every case either the plate or the rail broke.

DESIRABILITY OF PREHEATING OR POST-HEATING

Cases 34 to 41 inclusive were made up to test (a) different methods of welding the rail to the International steel tie and (b) the desirability of preheating or post-heating. A record was kept in these cases of the points where the welding of the splice bar to the rail was started and finished. If the joint broke at the point where the weld was started, it would be obvious that preheating is required, since as the arc is continued along the seam weld it automatically preheats ahead of it. On the other hand, if the weld broke at the point where the welding was stopped, it would seem that post-heating is needed.

Case 34 was a joint made up in a manner similar to Cases 32 and 33, except for the spot welding of the bolts and nuts. The rail broke at two points, showing complete failure near the end of the joint plate and partial failure of the base of the rail at the center. Other welds were intact, except a short section of the bottom weld of one joint plate. In the photograph of the broken specimen, *ABC* is the rail break, and *DE* the crack in the rail base. In the drawings and photographs *S* shows the starting point and *F* the finishing point of the seam welds between splice bars and rail.

Case 35 was a check test on Case 34 except in the direction in which the welds were made. Here the base of the rail and part of the web broke near the joint. One tie seam between the base of the rail and the tie showed partial failure. The joint plates and the other welds were intact. In the photograph, *AB* represents the break in the base of the rail.

Case 36 was made up the same as Case 34, except that both the tie welds were lapped back at both ends for about 1½ in. Here the rail broke in two places, a complete rail failure at the end of the joint plate and failure of the rail base near one end of the tie seam. Other welds, the joint plates and the tie plate were intact. The rail failure is shown as *ABC* in the photograph.

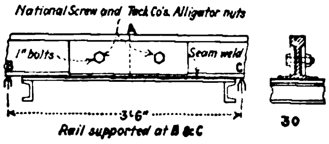
Case 37 was a check test on Case 36. The rail broke in two places—completely near the end of the joint plate, and the rail base at the end of the tie seam. One joint plate cracked from the bottom to the bolt hole. Otherwise, welds and plates were intact. In the photograph, *ABC* is the rail failure, and *DE* the base break.

In cases 34 to 37 inclusive the failure was at about the same magnitude of load application. The breakage was in the rails, the welds holding up well.

Case 38 was made up in a manner similar to the four preceding cases, except that two tie welds each 3½ in. long at the ends were substituted for the 6-in. or 6½-in. weld at the center of the tie. Here the rail broke at one end of the joint plate, and the tie weld between one end of the steel tie and the rail failed. Otherwise, plates and welds were intact. The photograph shows *ABC* as the broken rail.

Case 30
Electric Arc Weld

91 lb. 7 in. tee rail, ¾ in. x 20 in. splice bars bolted with two 1 in. bolts, not welded. International steel tie welded to base of rail.



Rail supported at B & C

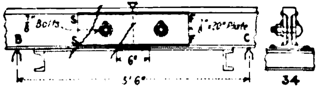
Only one-half International steel tie used.

Load Applied At "A"	Deflection in in.
25,000 lb.	.0625
40,000 lb.	.1250
50,000 lb.	.1250
75,000 lb.	.1875
90,000 lb.	.2500
100,000 lb.	.3125
177,800 lb.	Prob. elas. limit
193,800 lb.	Failure

Tie split entirely across at line of junction of the two rail sections. Weld unbroken, both bolts stretched allowing plates to warp slightly.

Case 34
Electric Arc Weld

91 lb. 7 in. tee rail, ⅞ in. x 20 in. splice bars bolted with two ⅞ in. bolts, bolts and nuts spot welded, plates seam welded top and bottom, base of rail welded to one-half of International steel tie.



Rail supported at B & C

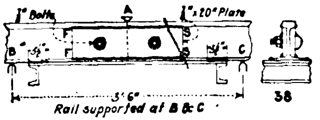
Load Applied At "A"	Deflection in in.
25,000 lb.	.0625
40,000 lb.	.0625
50,000 lb.	.1250
60,000 lb.	.1250
75,000 lb.	.1250
90,000 lb.	.1875
92,000 lb.	1st report
100,000 lb.	.2500
105,950 lb.	See below

Rail failed at two points. welds intact, except part of bottom weld of one splice bar.

Note.—For explanation of "F," "S" and wavy lines for this and following tests, see note under Case 41.

Case 38
Electric Arc Weld

91 lb. 7 in. tee rail, ⅞ in. x 20 in. splice bars bolted with two ⅞ in. bolts, bolts and nuts spot welded. Plates seam welded top and bottom. Base of rail welded to one-half of International steel tie.



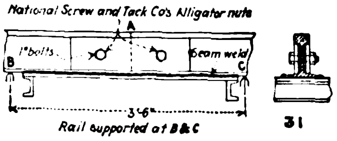
Rail supported at B & C

Load Applied At "A"	Deflection in in.
25,000 lb.	.0312
40,000 lb.	.0625
50,000 lb.	.0937
53,000 lb.	1st report
60,000 lb.	.1250
75,000 lb.	.1250
90,000 lb.	.1562
95,000 lb.	2nd report
100,000 lb.	.1875
110,000 lb.	.2031
120,000 lb.	.2500
138,000 lb.	1.0000

Rail broke at end of splice bar. Tie weld at one end failed. Plates and other welds intact.

Case 31
Electric Arc Weld

91 lb. 7 in. tee rail, ¾ in. x 20 in. splice bars bolted with two 1 in. bolts, not welded. International steel tie welded to base of rail.



Rail supported at B & C

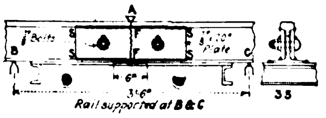
Only one-half International steel tie used.

Load Applied At "A"	Deflection in in.
25,000 lb.	.0000
40,000 lb.	.0312
50,000 lb.	.0625
75,000 lb.	.0937
90,000 lb.	.1250
100,000 lb.	.1250
125,000 lb.	.1562
150,000 lb.	.2500
229,700 lb.	.8750

Failure occurred at 229,700 lb. Results same as in Case 30.

Case 35
Electric Arc Weld

91 lb. 7 in. tee rail, ⅞ in. x 20 in. splice bars bolted with two ⅞ in. bolts, bolts and nuts spot welded. Plates seam welded top and bottom. Base of rail welded to one-half of International steel tie.



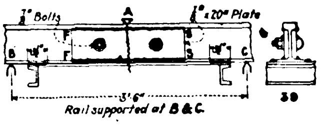
Rail supported at B & C

Load Applied At "A"	Deflection in in.
25,000 lb.	.0625
40,000 lb.	.0625
50,000 lb.	.0625
60,000 lb.	.1250
75,000 lb.	.1250
90,000 lb.	.1562
100,000 lb.	1st report
105,170 lb.	.1875
118,700 lb.	1.2812

Rail failure near joint. Partial failure of one tie seam. Other welds and splice bars intact.

Case 39
Electric Arc Weld

91 lb. 7 in. tee rail, ⅞ in. x 20 in. splice bars bolted with two ⅞ in. bolts, bolts and nuts spot welded. Plates seam welded top and bottom. Base of rail welded to one-half of International steel tie.



Rail supported at B & C.

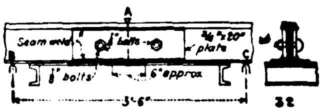
Load Applied At "A"	Deflection in in.
25,000 lb.	.0000
40,000 lb.	.0156
50,000 lb.	.0468
60,000 lb.	.0781
75,000 lb.	.1250
85,000 lb.	1st report
90,000 lb.	.1250
100,000 lb.	.1718
110,000 lb.	.2031
120,000 lb.	.2500
128,100 lb.	3.1250

Complete Failure

Both splice bars split at center. Numerous breaks in joint plate welds. Tie welds at one end failed.

Case 32
Electric Arc Weld

91 lb. 7 in. tee rail, ¾ in. x 20 in. splice bars bolted with two ⅞ in. bolts. Plates seam welded top and bottom. Base of rail welded to one-half of International steel tie.



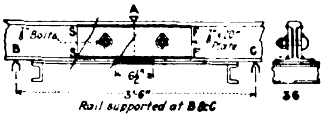
Rail supported at B & C

Load Applied At "A"	Deflection in in.
25,000 lb.	.0625
40,000 lb.	.1250
50,000 lb.	.1250
62,400 lb.	.1875
75,000 lb.	.2500
82,000 lb.	.9062
82,400 lb.	3.3125

Rail broke [illegible], starting at end of weld to tie, extending up through bolt hole. Splice bar broke at bottom, extending up through bolt hole.

Case 36
Electric Arc Weld

91 lb. 7 in. tee rail, ⅞ in. x 20 in. splice bars bolted with two ⅞ in. bolts, bolts and nuts spot welded. Plates seam welded top and bottom. Base of rail welded to one-half of International steel tie.



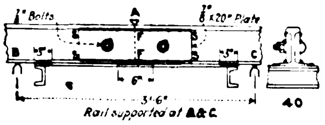
Rail supported at B & C

Load Applied At "A"	Deflection in in.
25,000 lb.	.0156
40,000 lb.	.0312
50,000 lb.	.0468
54,000 lb.	1st report
60,000 lb.	.1250
75,000 lb.	.1562
90,000 lb.	.2187
96,100 lb.	See Below

Rail broke at 2 points. Welds and splice bars intact.

Case 40
Electric Arc Weld

91 lb. 7 in. tee rail, ⅞ in. x 20 in. splice bars bolted with two ⅞ in. bolts, bolts and nuts spot welded. Plates seam welded top and bottom. Base of rail welded to one-half of International steel tie.



Rail supported at B & C

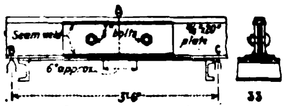
Load Applied At "A"	Deflection in in.
25,000 lb.	.0000
40,000 lb.	.0000
50,000 lb.	.0000
60,000 lb.	.0312
75,000 lb.	.0625
90,000 lb.	.0625
100,000 lb.	.1250
110,000 lb.	.1250
120,000 lb.	.1406
130,000 lb.	1st report
132,650 lb.	

Complete destruction

Rail broke in two places. One splice bar weld failed at one end. Tie welds at one end failed. Splice bars intact.

Case 33
Electric Arc Weld

91 lb. 7 in. tee rail, ¾ in. x 20 in. splice bars bolted with two ⅞-in. bolts. Plates seam welded top and bottom. Base of rail welded to one-half of International steel tie.



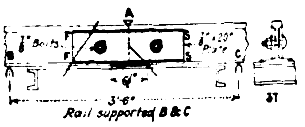
Rail supported at B & C

Load Applied At "A"	Deflection in in.
25,000 lb.	.0312
40,000 lb.	.0937
50,000 lb.	.1250
75,000 lb.	.1875
87,000 lb.	.3437
87,100 lb.	3.1875

Results same as in Case 32.

Case 37
Electric Arc Weld

91 lb. 7 in. tee rail, ⅞ in. x 20 in. splice bars bolted with two ⅞ in. bolts, bolts and nuts spot welded. Plates seam welded top and bottom. Base of rail welded to one-half of International steel tie.



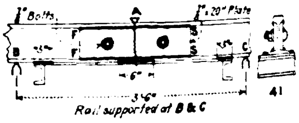
Rail supported B & C

Load Applied At "A"	Deflection in in.
25,000 lb.	.0312
40,000 lb.	.0468
50,000 lb.	.0625
60,000 lb.	.1250
72,000 lb.	1st report
75,000 lb.	.1406
90,000 lb.	.1562
103,900 lb.	See below

Rail broke at two points. One splice bar cracked from bottom to bolt hole. Welds intact.

Case 41
Electric Arc Weld

91 lb. 7 in. tee rail, ⅞ in. x 20 in. splice bars bolted with two ⅞ in. bolts, bolts and nuts spot welded. Plates seam welded top and bottom. Base of rail welded to one-half of International steel tie.



Rail supported at B & C

Load Applied At "A"	Deflection in in.
25,000 lb.	.0000
40,000 lb.	.0000
50,000 lb.	.0312
60,000 lb.	.0625
75,000 lb.	.0937
96,000 lb.	.1250
100,000 lb.	.1406
110,000 lb.	.1562
120,000 lb.	.1875
127,600 lb.	1st report
130,100 lb.	2.3750

Test Discontinued

Rail broke near joint. One splice bar split. Tie welds at one end of tie failed, other welds intact.

Note:

Previous to Case 34 no record was kept of start and finish of weld, or of point of fracture.

"S" shows starting point of welding on seam welds between splice bars and rail.

"F" shows finish point of welding on seam welds between splice bars and rail.

Wavy lines show where rail and splice bars broke under load as applied.

Records of Final Detroit Joint Tests, Cases 30 to 41 Inclusive

These all relate to seam-welded joints with an International steel tie welded to the base of the rails

Case 39 was a check test on Case 38. Here both joint plates split at the joint and through the bolt holes. There were numerous cracks and breaks in the joint plate welds, and both tie welds at one end of the tie failed. In the photograph, *ABC* and *G* show the breaks in the joint plates, and *DEF* the points of failure of the plate welds.

Case 40 was made up with tie welds at the rail joint and at the ends of the tie. In this case the rail broke in two places; complete failure at one end of the joint plate and breakage of the base of the rail near the center joint. The joint weld cracked on one end near the bottom center, and the tie welds at one end of the tie failed. The joint plates remained intact. In the photograph, *ABC* shows the rail break, *DEF* the rail base failure.

Case 41 was a check test on Case 40, except in the direction in which the welds were made. Here the base of the rail broke near the joint, one joint plate cracked and the other plate split through the center. The tie weld at one end of the tie failed, with the other welds intact. In the photograph, *AB* shows the break in the base of the rail, and *CD* the break and split in the joint plates.

CONCLUSIONS FROM CASES 34-41 INCLUSIVE

The most effective method of welding the tie to the rail is by a short weld at each end of the tie. This gives a distinctly stronger joint than with a tie weld just at the joint. When tie welds are used at the ends of the tie, it is more or less superfluous to make the center tie weld.

No definite conclusions could be drawn as to the desirability of preheating or post-heating. Records were kept of the point of starting and finishing each joint plate weld, but these welds held up almost uniformly, and where failure took place, it was not consistent in its relation to the point where the weld was started or finished.

WELDING WIRE

During the course of these experiments the department has used a number of different makes and kinds of welding wire. A great variation has been found in the chemical composition of the numerous welding wires now on the market, as well as in their qualities of "laying in" without sputtering during the welding process. The wire used recently by the department for track welding has been the No. 9 wire of the Wilson company, but tests are now being made at the department chemical laboratory to determine whether changes in the chemical composition of this welding wire for Detroit conditions can be made to advantage.

CAST-WELDED JOINTS

As about 80 per cent of the Detroit city rail joints in the past have been made by the cast-welded process, the department has naturally taken out many of these joints in its work of rehabilitation. Altogether, nearly 700 of these joints have been removed, though this does not represent the total number of cast-welded joints discovered to be defective during the work of reconstruction. When a cast-welded joint in track which is not being replaced is found mechanically good but electrically defective, the department simply bonds around it. If mechanically defective, a section of rail 6 ft. in length is cut out and replaced by a section seam welded by joint plates to the adjoining rails.

The largest proportion of cast-welded joints removed were defective because (1) the ball of the rail had broken out of the joint and the rail was pumping, (2) the rail was split vertically, generally at the casting, or (3) the bottom part of the weld was split off horizontally. Table I gives a record of cast-welded joints removed between May 15, 1922, and April 9, 1923.

Typical forms of broken joints are illustrated.

CHEMICAL ANALYSIS OF CAST-WELDED JOINTS

To determine any chemical and physical effects in the rail at the joint caused by the cast-welding process, a typical joint was selected, and a chemical analysis made. Test specimens were taken of the casting at five points and of the rail at two points. The results are given in Table II.

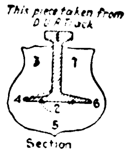
TABLE I—RECORD OF CAST-WELDED JOINTS REMOVED BETWEEN MAY 15, 1922, AND APRIL 9, 1923

Cracked underneath the ball of the rail	579
Ball of rail broken in casting	64
Casting broken	14
Rail broken through the web inside the casting	9
Rail broken at the end of the casting	7
Rail broken, beginning at the casting and ending some distance away	1
Solid joints	6
Total joints removed	680

As will be seen from the table, no great change was made in the chemical composition of the rail by the process, but the hardness of the section of the rail not inclosed by the weld is higher than at the base of the rail. It is thought this may be due to a slight softening of the base of the rail when the molten metal was poured on it with the slow cooling of the heavy mass. It may also be possible that the head of the rail became compressed and so harder than it was originally through pounding of the car wheels over it in service. The test also showed that the only place at which there was any fusion in the joint was near the bottom of the rail evidently on the side where the molten metal was poured into the mold surrounding the rail end. This is indicated in the drawing, in which the dotted line represents the original form of the rail and the solid line shows the actual edge as it existed in the weld.

TABLE II—CHEMICAL ANALYSIS AND HARDNESS RECORD OF TYPICAL CAST-WELDED JOINT REMOVED

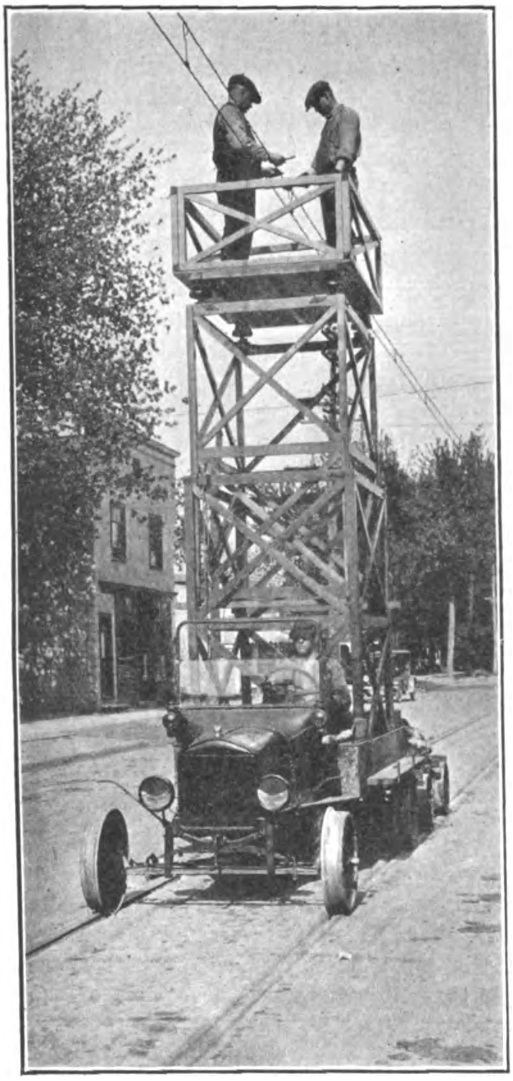
Carbon Per Cent	Phosphorus Per Cent	Manganese Per Cent	Sulphur Per Cent	Silicon Per Cent	Brinell Hardness	No.
0.741	0.041	0.722	0.0367	0.073	292	1
0.762	0.041	0.734	0.0285	0.085	278	2
3.28	0.434	0.428	0.0364	1.70	142	3
3.58	0.446	0.476	0.0426	1.53	134	4
3.57	0.443	0.459	0.0372	1.69	134	5
3.54	0.428	0.476	0.0356	1.57	133	6
3.54	0.454	0.453	0.0426	1.65	144	7



One cause of the poor results in these cast welds is believed to be the lack of care as to the quality of the iron used in the welding cupola. The cupola was evidently used as a catch-all for all kinds of scrap iron about the property, such as broken car wheels and brakeshoes. In one case a half fused bolt was found imbedded in the weld, evidently having passed through the gate before it was fully melted.

SUMMARY

In summary, it may be said that the tests on seam and cast-welded joints in Detroit indicate (1) that the cast-welding process, besides being more inconvenient to apply, is less reliable for rail joints than the seam-welding process; (2) that the method of joint construction with seam-welded joints used in Detroit is effective both mechanically and electrically, and (3) that further study of the metallurgy of electrically welded rail joints is desirable.



The Line Car Is Insulated for High Voltages

Self-Propelled Line Car Useful on Interburban

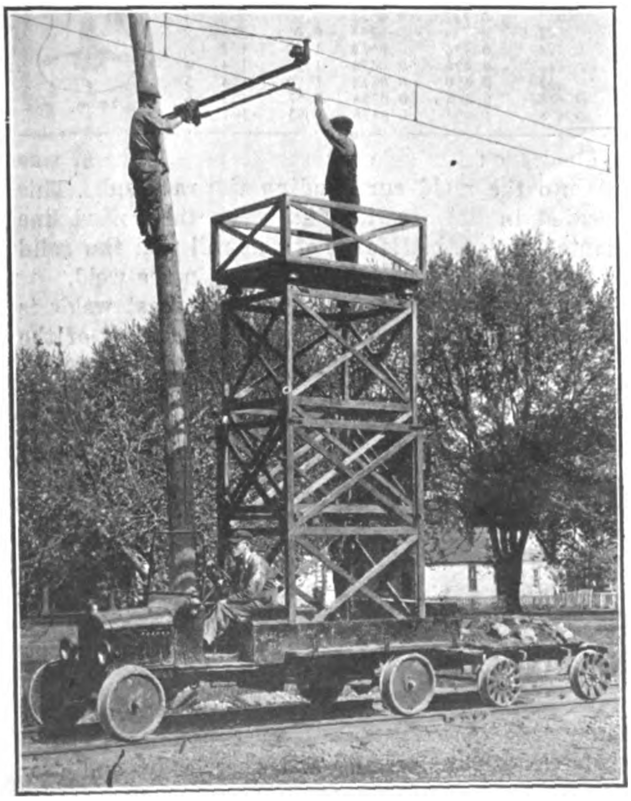
Line Car Made from Ford Truck Can Go Anywhere, Even Though Power Is Off—Useful Both for Line Work and General Construction

A VERY flexible type of line and work car has been constructed by the Windsor, Essex & Lake Shore Railway at Kingsville, Ont. This machine has been in use for several months and has been found especially advantageous for all purposes. A standard Ford truck chassis was used as a basis, the pneumatic tires and wheels being removed and wooden wheels with steel tires having an M.C.B. tread substituted. These wheels were supplied by the Kalamazoo Railway Supply Company. On the bed a collapsible tower was built of long-leaf fir. This was carefully dried out and given three coats of insulating varnish. On top of the tower directly beneath the platform were mounted four 66,000-volt insulators, which give sufficient protection when the men are working on the high-voltage trolley wire. The railing on the tower can be folded flat, as shown in one of the illustrations, so that when the tower is lowered and the railing dropped, the total height above the ground is only about 12 ft. This enables it to pass under any ordinary obstruction.

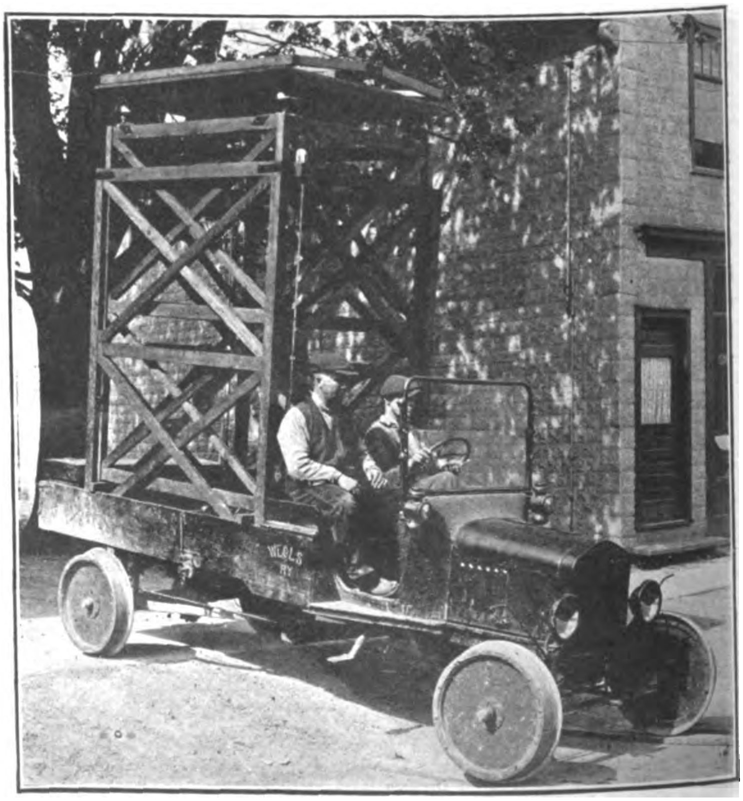
By removing the four bolts that hold the car to the bed, it can be taken off and the body used for transporting material; seats also can be supplied so that the car can be used as a passenger car to carry twelve men. The engine has sufficient power to drive the car at 20 m.p.h. on the track. It is also possible to haul a small lorry or a flat car to carry a load of material.

The valuable feature of this car, especially in interurban work, is that it can run when the wires are dead. Since this is a single-track line a break in the trolley wire would in certain cases require taking off all power, so that it would be quite difficult to reach an isolated location if an electric line car were used.

In remodeling the Ford truck the steering device was not removed from the front wheel, but was merely tightened up. It is possible to take the car off the track by means of a derailing block, and run the



A Small Trailer Can Be Hauled by the Line Car



The Car Can Travel on an Ordinary Road Under Its Own Power machine onto a road, just as well as the ordinary construction gang can a hand car. The machine can be operated for considerable distances on its own power by laying boards for the wheels to run on. In fact, it is possible to run without the use of boards.

Where it is not possible to run the car off the track for turning it around a novel arrangement can be used. A point at the exact center of the car is marked on the chassis. A small telescoping hydraulic jack is carried in the equipment. The car can be stopped so that its center is directly over a tie, so that the car can be jacked up at the center and spun around. Even though it may not be in exact balance one or two men can take care of the excess weight and swing the car with little difficulty.

The work of constructing the car on the Ford chassis was all done in the company's plant, and the cost of the entire outfit was less than $1,000. It was designed by Albert Eastman, formerly vice-president and general manager of the system.

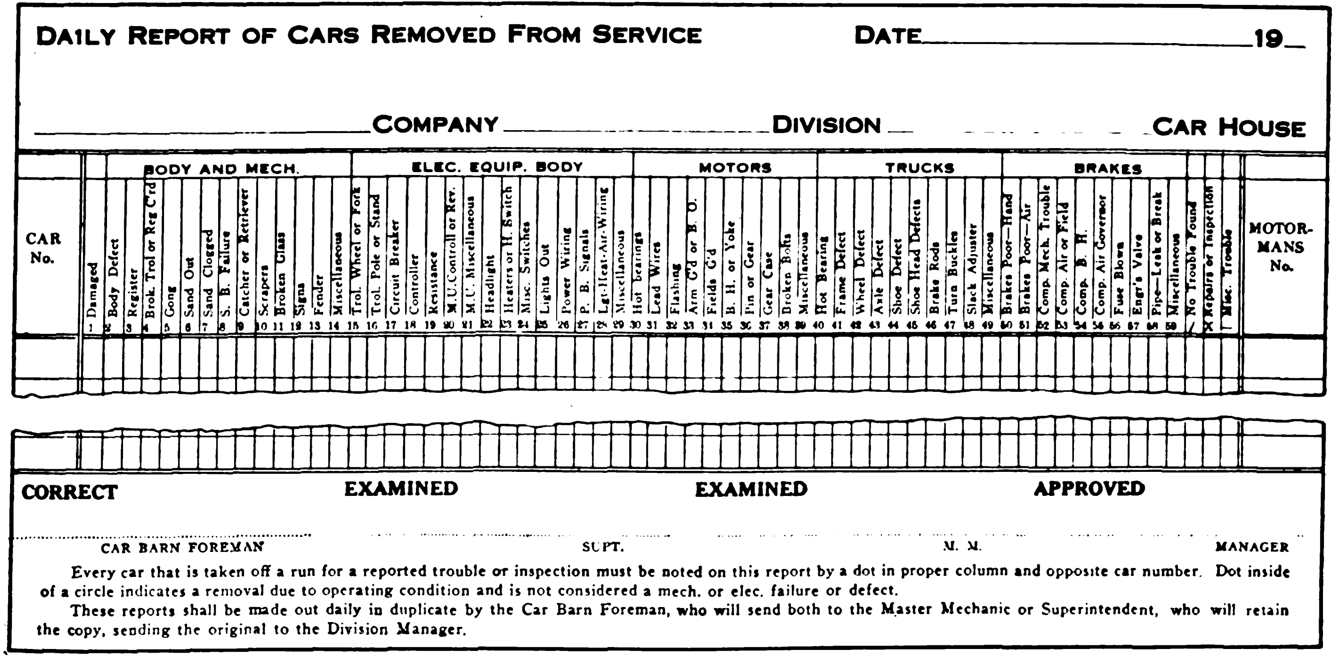
Specifications for Labor

The Power and Equipment Department of the Connecticut Company Has Drafted Specifications for the Work Required in Car Overhauling and Periodic Inspections—It Also Has a Simple System for Tabulating and Charting Essential Data

As EXPLAINED in an article which appeared in the July 7 issue of this paper, the power and equipment department of the Connecticut Company has developed charts covering the functions and duties of the heads of the various departments. In addition, the department maintains graphical records of every element of the power and equipment operations and has established a series of monthly ratings for stimulating the power and equipment work among the various divisions of the company. It has also drafted a series of specifications for such equipment work as overhauling, mileage inspection and daily inspection, so that each department and each department head may know exactly what is to be done under each of these classes of work. In other words, the department has applied to labor the same principles of standardization by specification as it applies to material purchased, with a resulting more definite understanding by every one along the line of what is wanted.

All shop work is done by specifications, drafted as carefully as if they were specifications for the purchase of material. There are three general specifications for shop work, namely (1) covering general overhaul of rolling stock; (2) covering mileage inspection, based on a service of 1,000 miles for city cars and 1,500 miles for interurban cars, and (3) daily inspection. On page 98 a few extracts of the specifications for overhaul are printed to give an idea of their nature. The specifications for mileage and daily inspection follow and are published in full.

There are several points about these specifications which are not apparent in their text, but they add much to the convenience of their use. One of these is that practices in the work of overhaul which are likely to change are made the subject of supplemental instruction rather than being embodied in the main specifications which are printed and consequently semi-permanent. An example of the practice method is shown under the specification on painting which says that the work shall be carried out in accordance with letter of instruction 179, with the application of colors given in two other letters of instruction. In this way it is pos-



DAILY REPORT OF CARS REMOVED FROM SERVICE **DATE**____________________**19**__

____________________**COMPANY**____________________**DIVISION**____________________**CAR HOUSE**

		BODY AND MECH.													ELEC. EQUIP. BODY														
CAR No.	Damaged	Body Defect	Register	Brok. Trol or Reg C'rd	Gong	Sand Out	Sand Clogged	S. B. Failure	Catcher or Retriever	Scrapers	Broken Glass	Signs	Fender	Miscellaneous	Trol. Wheel or Fork	Trol. Pole or Stand	Circuit Breaker	Controller	Resistance	M.U.Controll or Rev.	M.U. Miscellaneous	Headlight	Heaters or H. Switch	Misc. Switches	Lights Out	Power Wiring	P. B. Signals	Lgt-Heat-Air-Wiring	Miscellaneous
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29

	MOTORS										TRUCKS										BRAKES													
CAR No.	Hot bearings	Lead Wires	Flashing	Arm C'd or B. O.	Fields G'd	B. H. or Yoke	Pin or Gear	Gear Case	Broken Bolts	Miscellaneous	Hot Bearing	Frame Defect	Wheel Defect	Axle Defect	Shoe Defect	Shoe Head Defects	Brake Rods	Turn Buckles	Slack Adjuster	Miscellaneous	Brakes Poor—Hand	Brakes Poor—Air	Comp. Mech. Trouble	Comp. Air or Field	Comp. B. H.	Comp. Air Governor	Fuse Blown	Engr's Valve	Pipe—Leak or Break	Miscellaneous	No Trouble Found	Repairs or Inspection	Misc. Trouble	MOTOR-MANS No.
	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	/	X	⊤	

CORRECT **EXAMINED** **EXAMINED** **APPROVED**

CAR BARN FOREMAN	SUPT.	M. M.	MANAGER

Every car that is taken off a run for a reported trouble or inspection must be noted on this report by a dot in proper column and opposite car number. Dot inside of a circle indicates a removal due to operating condition and is not considered a mech. or elec. failure or defect.

These reports shall be made out daily in duplicate by the Car Barn Foreman, who will send both to the Master Mechanic or Superintendent, who will retain the copy, sending the original to the Division Manager.

This Is Half of the Form Kept by the Statistical Department to Give a Continuous Record of Causes of Pull-Ins

THE CONNECTICUT COMPANY

ENGINEERING DEPARTMENT SPECIFICATION NO. 627-72122 SUPERSEDING SPECIFICATION NO. 627-21421
COVERING GENERAL OVERHAULING OF ROLLING STOCK

SCOPE

General.—This specification covers in general the overhauling of motor cars at the expiration of a predetermined mileage and is intended to cover so-called "Back Shop Work," consisting of general overhauling or heavy repairs.

Mileage.—All double-truck closed passenger cars shall be overhauled according to this specification at the expiration of a 100,000-mile period of service.

All single-truck closed cars, all express, stone and other revenue, motor freight and express cars shall be overhauled in line with this specification at the expiration of a 75,000-mile period of service.

All non-revenue cars, such as service cars, work cars, line cars, supply cars, snow plows, snow sweepers, etc., shall be overhauled when they require it.

Each master mechanic is expected to keep in very close touch with the physical condition of rolling equipment under his charge, and if there are any cars of any nature that are not safe to operate or, in the case of cars which are overhauled on a mileage basis and which cannot complete the mileage specified above, the car should be immediately withdrawn from service and the matter taken up with this department for permission to overhaul the car in advance of its regular schedule.

A. E. R. A. Standards.—In so far as it is practical it is the intention of the engineering department to follow the standards as adopted by the American Electric Railway Engineering Association. Each master mechanic is expected to make himself conversant with these standards and will be advised which of these standards have been adopted by the Connecticut Company in whole or in part.

CAR BODIES

General.—Car bodies shall be lifted from the trucks, thoroughly inspected, cleaned and overhauled. They shall be washed and all necessary repairs made to frame, roof, floors, platforms, steps, bumpers, etc. A careful inspection shall be made for loose fittings or parts, such as grab handles, door hinges, window catches, screws, nails, and any parts liable to cause accident, inconvenience or poor appearance shall be repaired or renewed.

Car bodies need not necessarily be painted when general overhauling is made unless they actually require it.

Painting.—When it is necessary to repaint cars (this need not necessarily be at the same time the car is overhauled) the enamel system of car painting shall be used, unless otherwise specified by the engineering department. This work shall be carried out in accordance with letter of instruction No. 179. For details as to use of different colors see letter of instruction No. 203, and for special paint and colors see letter of instruction No. 247.

Curtains, Car.—All curtains are to be washed and where required removed, repaired and renovated. On all renewals standard curtain material will be used, which is dark green double-coated Pantasote, color No. 86, except in cases where it does not match up with existing curtains. In so far as possible the practice shall be followed of equipping one car complete with new standard curtains and using the curtains removed from this car to match up with old style curtains in other cars.

All curtain fixtures shall be thoroughly gone over. Springs so adjusted that curtain will operate properly, catches lubricated and curtain placed in first-class operating condition.

Curtains, Vestibule.—All vestibule curtains shall be thoroughly cleaned and applied in accordance with letters of instruction Nos. 84 and 159. The height of the bottom of the curtains from the floor shall be approximately 36 in. The material of all curtains shall be brown denim, supported by iron rings (not over 6-in. spacing) on iron rods. All cars that are now equipped with roller curtains shall be changed to the sliding type of curtain.

Steps.—Car steps shall be thoroughly gone over and necessary repairs made. Where treads or risers are badly worn they shall be replaced. The heights shall be checked in accordance with letter of instruction No. 261, namely: Where underframe and equipment construction will permit doing so on the closed cars now in service the distance from the top of the rail to the top of the step must not be more than 15 in. From the top of the step to the vestibule floor shall not exceed 13 in., and under any circumstances these heights shall not exceed 16½ in. and 15½ in. respectively. On double-truck open cars the first, or bottom step, of the double folding steps shall not be over 16 in. above the top of the rail and the second step shall not be more than 13 in. above the first step, and not more than 13 in. below the floor of the car.

Closed cars purchased previous to 1916, when requiring new steps or treads, shall be equipped with standard car step as shown on drawing No. C-404 and covered by letter of instruction No. 148.

Heaters and Heat Regulation.—Heater switches to be inspected, tested and placed in good condition. Broken handles, burned fuse clips and connections to be renewed and covers closed properly. Heaters shall be properly fastened in place and circuits closed. Each circuit shall be tested with an ammeter to find if heaters are up to requirements and no short circuits and irregularities exist. In repairing heaters all enamel crimp rods shall be renewed with porcelain. Heaters and automatic heat regulators shall be carefully inspected and cleaned and connections tested. The heat regulator should be operated by short circuiting thermostat connections to determine if in working order and the heat regulator boxes locked in accordance with letter of instruction No. 201.

Lighting Circuits.—All lighting circuits to be thoroughly inspected and tested. Sockets of the same type shall be used throughout in individual cars. If it becomes necessary to change the headlinings in the older type of closed cars they shall be rewired in accordance with letter of instruction No. 103, drawing No. C-572. All lighting switches and fuse blocks to be thoroughly cleaned and tested and defective ones replaced. Each switch and fuse shall be marked distinctly "Light Circuit" in small letters. For standard types of snap switches, receptacles, sockets, plugs, cleats, rosettes, combination shade holders, sockets and shades see letter of instruction No. 144.

BRAKES

General.—Extreme care must be taken in inspecting and overhauling brake equipment and foundation brake rigging. The brake rigging shall be checked to see that the present braking power, i.e., the relation between brake-shoe pressure and the empty weight of the car, falls within the range of 90 and 100 per cent with 55 lb. of air pressure. This should be checked in accordance with the formula shown on drawing No. C-6.

Compressors.—Compressors shall be thoroughly cleaned and inspected. All bearings shall be tested for wear, lost or defective bolts replaced, valves removed and cleaned, vents cleaned out, back head and pistons removed, cylinders cleaned, greased, reassembled and tested for leakage. Compressor then refilled with oil while at rest and given a five-minute performance test. Compressors requiring extensive repairs shall be sent to the reclamation shop.

Governors.—Governors shall be thoroughly cleaned, wearing parts lubricated, arcing tips inspected and governor tested for proper operation.

Strainers.—Strainers to be removed and inspected. Hair-packed type to have hair removed, cleaned and repacked. Oil strainers to be washed out with kerosene and refilled. Strainers shall be installed on cars in accordance with letter of instruction No. 156.

Hand Brakes.—All hand-brake gearing, guides and bearings to be cleaned and oiled, care being taken that they are free from fouling, preventing unrestricted action. Hand brakes should work in harmony with air brakes.

Piston Travel.—Piston travel should be free and unrestricted and after the car is overhauled and with the car standing, should not exceed a maximum of 4 in. in accordance with letter of instruction No. 171.

CONTROL

General.—Controllers, main switches, line switches, switch guards, reversers, circuit interrupters, etc., shall be carefully inspected and thoroughly cleaned. Badly-worn fingers and segments to be replaced. Contacts that are badly burned to be filed smooth and adjusted or replaced by new ones. All charred insulating surfaces to be scraped and shellacked. Tighten bolted connections. All wires, cables, leads, bushings, connections, etc., shall be placed in first-class condition, well cleated with no loose connections.

Controllers.—All controllers shall be thoroughly blown out, cleaned and repainted and lubricated where necessary. All controllers shall be equipped with wooden covers. All controller fingers to be cleaned, filed and adjusted and replaced where necessary. For adjustment of fingers see letter of instruction No. 164.

Excerpts from Specifications for Overhaul sible for a change to be made in the methods of painting or in colors without requiring a change in the general specifications.

Another point is that the second number in the specification number gives the date on which the specification was issued, so that this date is apparent to anyone using the specifications. Thus there are two numbers at the head of the specification covering general overhaul. These numbers automatically declare that the specification on overhaul issued on July 21, 1922, superseded the specification for general overhaul issued on Feb. 14, 1921.

COMPARATIVE RECORD ON OVERHAULING

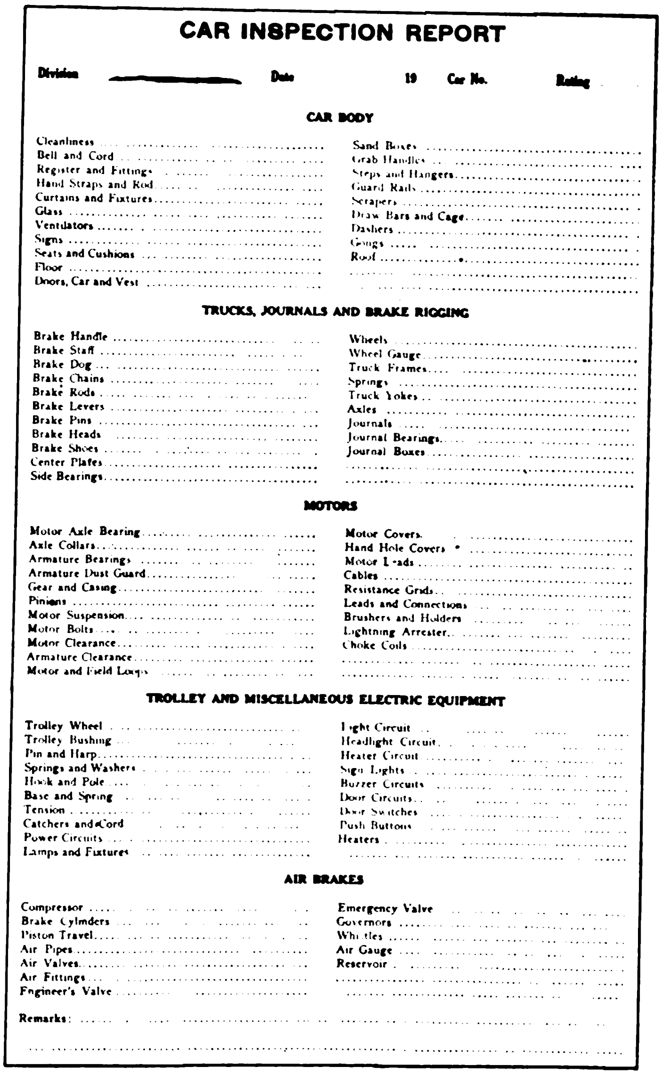
The specifications declare what system and methods should be used, but if the work were not followed up they would be of little value. The same thorough method of following up work is employed, however, as in specifying in the first place what is wanted.

The company requires from the foreman of each of its nine repair shops a report of the number of cars overhauled during each week. This information is tabulated to include also the number of cars overhauled during the year to date, the cars reported due for overhauling at the time the report is filed and the percentage of cars scheduled for overhauling that have been completed up to that date. Copies of this tabulation are sent to the president, manager and chief engineer of the company and also to the master mechanic and the superintendent of each division.

All overhauled cars have to be viséd by an inspector from the main office before being put back into service. There are two of these traveling inspectors, one for the northeastern and the other for the southeastern part of the state. They report on the condition of every part of the car, by means of the "Car Inspection Report" reproduced. A copy of this report is sent to the master mechanic of the division on which the car was inspected, and a copy is kept in New Haven.

CHECKING PULL-INS

On these reports the master mechanic is required to list the cause or causes for which every car is removed from service, the purpose of course being to determine if any car has a chronic ailment. In the method followed, however, the clerical work required at division shops or division headquarters in making out these reports on cause of failure has been reduced to a minimum.



CAR INSPECTION REPORT

Division ——— Date 19 Car No. Rating

CAR BODY

Cleanliness
Bell and Cord
Register and Fittings
Hand Straps and Rod
Curtains and Fixtures
Glass
Ventilators
Signs
Seats and Cushions
Floor
Doors, Car and Vest

Sand Boxes
Grab Handles
Steps and Hangers
Guard Rails
Scrapers
Draw Bars and Cage
Dashers
Gongs
Roof

TRUCKS, JOURNALS AND BRAKE RIGGING

Brake Handle
Brake Staff
Brake Dog
Brake Chains
Brake Rods
Brake Levers
Brake Pins
Brake Heads
Brake Shoes
Center Plates
Side Bearings

Wheels
Wheel Gauge
Truck Frames
Springs
Truck Yokes
Axles
Journals
Journal Bearings
Journal Boxes

MOTORS

Motor Axle Bearing
Axle Collars
Armature Bearings
Armature Dust Guard
Gear and Casing
Pinions
Motor Suspension
Motor Bolts
Motor Clearance
Armature Clearance
Motor and Field Loops

Motor Covers
Hand Hole Covers
Motor Leads
Cables
Resistance Grids
Leads and Connections
Brushes and Holders
Lightning Arrester
Choke Coils

TROLLEY AND MISCELLANEOUS ELECTRIC EQUIPMENT

Trolley Wheel
Trolley Bushing
Pin and Harp
Springs and Washers
Hook and Pole
Base and Spring
Tension
Catchers and Cord
Power Circuits
Lamps and Fixtures

Light Circuit
Headlight Circuit
Heater Circuit
Sign Lights
Buzzer Circuits
Door Circuits
Door Switches
Push Buttons
Heaters

AIR BRAKES

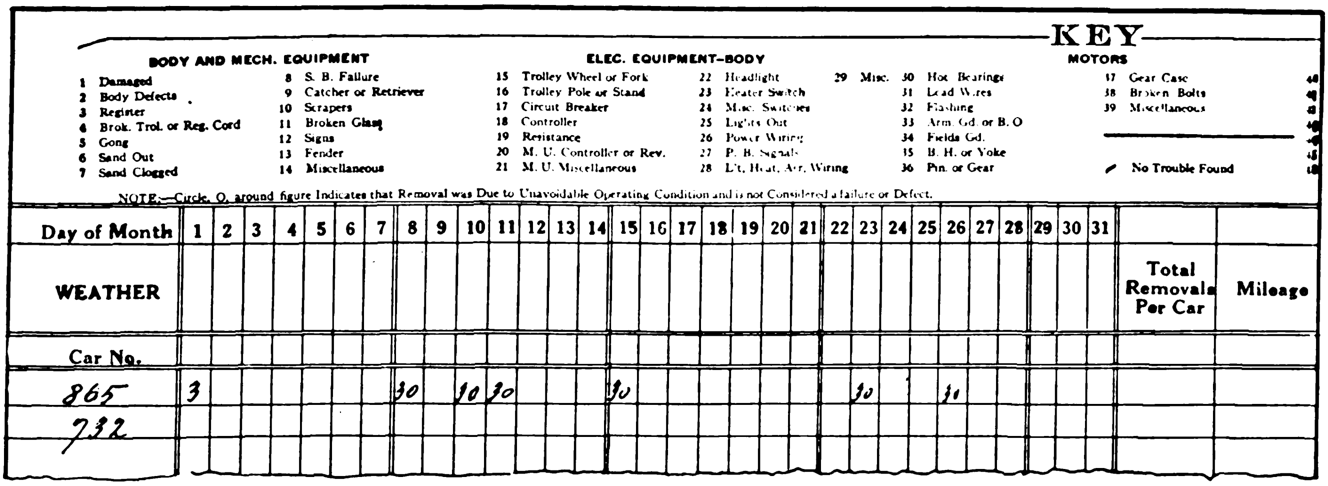
Compressor
Brake Cylinders
Piston Travel
Air Pipes
Air Valves
Air Fittings
Engineer's Valve

Emergency Valve
Governors
Whistles
Air Gauge
Reservoir

Remarks:

Inspectors from the Main Office Pass on Each Car Overhauled and Use This Blank

Thus, the first information about a pull-in which comes from the carhouse is in the form of a report made out by the carhouse foreman and signed by the superintendent, master mechanic and manager of the division. This report is sent to the chief engineer and gives the number of the car removed and the cause. To save clerical labor, the fifty-nine most common causes for removals are listed at the top of this blank,



KEY

BODY AND MECH. EQUIPMENT

1 Damaged
2 Body Defects
3 Register
4 Brok. Trol. or Reg. Cord
5 Gong
6 Sand Out
7 Sand Clogged
8 S. B. Failure
9 Catcher or Retriever
10 Scrapers
11 Broken Glass
12 Signs
13 Fender
14 Miscellaneous

ELEC. EQUIPMENT—BODY

15 Trolley Wheel or Fork
16 Trolley Pole or Stand
17 Circuit Breaker
18 Controller
19 Resistance
20 M. U. Controller or Rev.
21 M. U. Miscellaneous
22 Headlight
23 Heater Switch
24 Misc. Switches
25 Lights Out
26 Power Wiring
27 P. B. Signals
28 L't, Heat, Air, Wiring
29 Misc.

MOTORS

30 Hot Bearings
31 Lead Wires
32 Flashing
33 Arm. Gd. or B. O
34 Fields Gd.
35 B. H. or Yoke
36 Pin. or Gear
37 Gear Case
38 Broken Bolts
39 Miscellaneous

✓ No Trouble Found

NOTE.—Circle, O, around figure Indicates that Removal was Due to Unavoidable Operating Condition and is not Considered a failure or Defect.

Day of Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
WEATHER																																Total Removals Per Car	Mileage
Car No.																																	
865	3							30		10	30				30								10			31							
732																																	

Clerical Work Is Saved on This "Individual Record of Cars Removed from Service" by Using a Code Number for the Kind of Defect as shown, and all that the carhouse foreman has to do is to check the space indicating the ailment and indicate whether the removal was due to operating conditions or to a mechanical or electrical failure.

After this report is received and noted in the office of the chief engineer, it is sent to the statistical department, which is a part of the auditing department.

From these reports the statistical department tabulates by car numbers on a sheet 20 in. wide by 12 in. high a monthly "individual record of cars removed from service." The upper part of this form is reproduced. As will be seen, it shows at a glance whether the defect for which the car was removed is a chronic one, as would be the case in the example given if, during four days in eight, the car had to be removed for "30," which stands for hot bearings. A copy of this report is laid daily on the desk of the supervisor of repairs, and one is sent to the local master mechanic.

From this report a monthly summary for each carhouse is prepared, totaling the number of defects which have occurred among the fifty-nine varieties of possible causes. This report obviously makes clear whether any undue number of defects of any one kind develop in any carhouse. This report also gives the percentage which the total cars removed from service bears to the total number of cars operated from that carhouse.

Finally, the statistical department prepares a compilation of the relative standing of the carhouses of all the properties on the basis of total defects per 1,000 car-miles. In this table, which is printed in red and blue, a red figure (reproduced in the table in italics) indicates a decrease in defects and a betterment in the relative standing, while a blue figure, reproduced in Roman) shows the opposite. This table is also compiled on the basis of car-miles per defect, as this figure has the advantage of being larger. It is perhaps

STATEMENT SHOWING RELATIVE STANDING IN CARHOUSES OF ALL PROPERTIES, ON THE BASIS OF TOTAL DEFECTS PER THOUSAND CAR-MILES

Relative Standing for 1922							Total Defects per 1,000 Car-Miles		
Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Carhouses	1923	1922	1921
7	*4*	*4*	*3*	*1*	*1*	New Britain	0.084	*0.067*	0.159
10	11	14	*8*	*7*	*2*	Middletown	0.130	*0.081*	0.114
21	*7*	7	11	12	*3*	Derby	*0.180*	0.585	0.568
12	18	18	18	*11*	*4*	Wethersfield	0.195	*0.111*	0.283
3	12	*9*	*6*	*2*	5	Norwalk	*0.207*	*0.213*	0.520
1	1	1	1	16	*6*	Willimantic	0.210	0.000	2.750
8	9	11	*7*	*6*	7	Manchester	0.215	*0.169*	0.217
2	3	6	9	*8*	*8*	State Street	0.219	*0.206*	0.257
5	10	*3*	*2*	4	9	West Haven	0.225	*0.171*	0.188
14	16	19	19	*9*	10	Meriden	0.231	*0.214*	0.507
16	*8*	13	*10*	*10*	11	Vernon St.	0.260	*0.198*	0.222
11	15	*12*	15	*13*	*12*	James St.	0.262	*0.088*	0.191
5	14	8	*5*	*5*	13	Milldale	0.295	*0.151*	0.555
22	*21*	*10*	*21*	*15*	*14*	Dayville	0.314	0.266	0.181
19	20	*17*	*13*	14	15	Grand Ave.	0.319	0.300	0.255
5	5	*2*	17	17	*16*	Stamford	0.328	*0.142*	0.482
18	19	20	20	*19*	*17*	Torrington	*0.417*	0.750	0.437
19	*5*	23	*22*	*18*	*18*	Congress St.	0.515	*0.410*	0.730
7	*6*	15	*4*	*3*	19	Montauk Ave.	0.548	0.136	0.057
20	22	*21*	*16*	21	*20*	East St.	0.657	0.440	0.347
23	23	24	*23*	*23*	*21*	Waterbury	0.734	*0.277*	0.414
4	13	*5*	12	20	22	Greenville	0.789	*0.059*	0.204
24	24	*22*	*24*	*24*	23	No. Bennington	1.335	0.545	0.190
13	17	*16*	*14*	22	24	Zylonite	1.445	*0.723*	1.111

Italic figures indicate decrease in defects and betterments in standing.

THE CONNECTICUT COMPANY

Engineering Department

SPECIFICATION No. 629-21621.
COVERING
MILEAGE INSPECTION

This specification is intended to cover a systematic inspection of railway equipment after it has made a definite number of miles, and outline a definite program of inspection to meet the average conditions on the different divisions.

With this in view the following systematic inspection of railway equipment should be followed as far as practical:

Service—Interurban..Every 1,500 miles.
Service—City.......Every 1,000 miles.

1. Run the cars into the inspection shed and carefully examine their mechanical details, such as trucks, brakes, air piping, etc.

2. Inspect the electrical equipment, wiring, etc., and check for grounds and faulty operation.

3. Motors, controllers, switch groups and all auxiliary apparatus should be cleaned thoroughly by means of dry compressed air.

4. Necessary repairs to the car body and the details of the car should be made.

5. All wearing parts of the equipment such as bearings, commutators, brush-holders, carbons, trolley wheels, control contact tips, and drum rings should be overhauled and put in smooth running condition.

6. Gears, pinions, wheels, axles, trucks and brake details should be inspected and all worn or broken parts repaired or renewed.

7. Examine the arc chutes, electrical insulation and the car wiring, to see that they are in safe operating condition.

8. All covers on electrical apparatus and on motor bearings and journal boxes should be made to fit tightly, so as to keep out dust, snow and water.

9. Tighten all bolts on motors, gear cases, trucks, etc., and make all necessary repairs so that the cars will leave the inspection shed in such condition that they will require no further attention (other than that which is provided for by Specification No. 628-21621, daily inspection) until the next mileage inspection period.

10. Cars should be oiled on this inspection where possible and if it coincides with the general lubricating schedule. If, however, the general lubricating schedule does not coincide with the date on which the inspection under this specification is made the lubrication of the car should be very thoroughly gone over and if there is any doubt as to its ability to operate until the regular schedule date for lubrication the car should be oiled when this inspection is made.

11. Cars with bumpers, trolley poles, and other black iron work in rusty or dingy condition to have such iron work thoroughly scrubbed and cleaned and a coat of quick-drying black paint to be applied.

12. All mileage inspection shall be made in connection with Form E-215, "Car Inspection Report," which shall be signed by parties making inspection, approved by the foreman in charge, and then permanently filed in the office of the Master Mechanic.

[*Signed*] H. W. BEEBE,
Supervisor of Equipment.

Approved:
[*Signed*] P. W. RIPPLE,
Chief Engr. Power and Equipment.

THE CONNECTICUT COMPANY

Engineering Department

SPECIFICATION No. 628-21621.
COVERING
DAILY OR CASUAL INSPECTION OF
ROLLING EQUIPMENT

This specification is intended to cover daily or nightly inspection which should be given all equipment which is in service where possible and should consist of inspection of brake rigging, shoes and minor defects of cars and equipment reported by crews, such as broken glass, faulty door, bad trolley wheels, hot bearings, defective wiring, loose electrical contacts, faulty control operation, and on such of the older type motors as require it, oiling, etc.

This specification should also provide for the cars being swept out, dusted, and that their appearance and cleanliness are satisfactory for service.

Every car in service is to have this casual inspection made every day if possible, simply to determine if the car is in safe condition, clean, and satisfactory for operation. The general and thorough inspection should be made on a mileage basis, as covered by Specification No. 629-21621, dated Feb. 16, 1921, or such other specifications as may supersede them in the future.

[*Signed*] H. W. BEEBE,
Supervisor of Equipment.

Approved:
[*Signed*] P. W. RIPPLE,
Chief Engr. Power and Equipment.

Specifications for Mileage and for Daily Inspection also in more common use than its reciprocal, or a multiple of its reciprocal.

OTHER RECORDS ARE KEPT

A great many of the records of the mechanical department are kept in the form of charts. Among them the following have proved especially convenient:

Cost of maintenance in dollars per 1,000 car-miles for each division.

Number of pull-ins per 1,000 car-miles for each division.

Number of defects per 1,000 car-miles for each division.

Number of hot hearings per month for each division.

Cost of lubrication for each division and each carhouse.

Cost of overhead maintenance (covering accounts Nos. 17, 18, 20 and 22) per month in dollars per mile of track operated.

Number of signal boxes installed and number of interruptions per signal box per month.

Kilowatt-hours output total and per car-mile, monthly, for each division.

Number of track switch interruptions per month and total number of track switches on the system.

Number of trolley wire breaks per month, per mile of single track.

The company also keeps in tabular form, among other data:

Number of armatures rewound per month, showing type of motor, number of miles made between rewindings, etc.

Average weekly wage of the shop men.

Number of shop and carhouse men per car operated, regular, extra, total.

Number of pole renewals per week for each of the different overhead divisions, together with the number of poles behind and the number of poles ahead of the renewal schedule, and the percentage that the division is up to date on its pole renewal schedule.

Veneer Construction Has Advantages

BESIDES permitting the use of cheaper material in the core or on unseen surfaces, veneer construction has several other advantages over solid wood. According to the Forest Products Laboratory, Madison, Wis., these should be borne in mind by the purchaser who thinks that veneering cheapens the product. A panel of this construction has the advantages that it is more nearly of the same strength in all directions and that as it absorbs or gives up moisture it shrinks and swells about as much one way as another. Splitting along the grain in one set of plies is made impossible by the cross grain of the alternate plies, and rapid shrinking across the grain in the face veneers is offset by slow shrinkage along the grain in the core.

Veneered panels do not change dimensions as much as solid wood. Warping is largely eliminated in thick panels by plywood construction. More care can be taken in the selection of surface wood in veneered products than can be taken in solid products. The manufacturer can dry veneer stock very quickly and cheaply, and he can utilize all of his wood to the best advantage.

Glued joints when correctly made are as strong as the wood under ordinary service conditions. Many failures in glued-up wood are caused by "starved" joints, or joints in which the film of glue between the wood surfaces is not continuous. Such joints are not necessarily the result of a lack of glue spread on the wood. Heavy spreads are as likely to produce them under ordinary commercial conditions as light spreads. They are caused rather by the application of pressure to the joint while the glue is too fluid. Starved joints are more likely to occur with glues of low viscosity, such as warm animal glue and most blood albumin glues, than with casein, vegetable and other thick glues.

Some woods are more susceptible to the production of starved joints than others. Birch, maple, red oak, and ash, which have open pores, absorb glue from the spread in such considerable amounts that they often leave the joints starved. Basswood and yellow poplar also take up a great deal of glue, but weak joints are not very noticeable in these woods because the woods themselves are weak. Other woods with smaller cells open to the gluing surface do not seem to be so subject to starved joints.

To avoid starved joints it is necessary to mix a glue solution thick or allow it to thicken on the wood from drying or chilling before pressure is applied. When it is necessary to glue under conditions which might produce starved joints, the use of light pressure is advantageous.

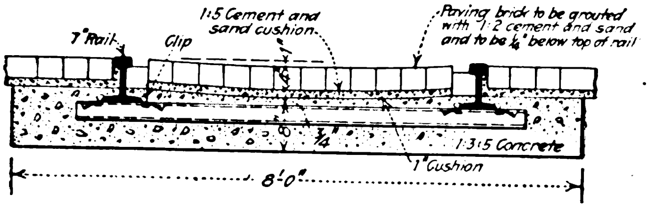
Results with Steel Tie Construction

City and Interurban Railway Produces Pictures and Figures to Show Condition of Track After Twelve Years of Service

BY LOUIS A. MITCHELL
Engineer Maintenance of Way, Union Traction Company

DURING the years that steel ties have been in use many articles have been written describing and illustrating the different construction methods and the difficulties encountered in building this type of track. But comparatively little information has been published to show how this type of track construction is standing up. Steel ties have now been in service long enough to make possible an appraisal of their work as part of the track foundation.

The Union Traction Company of Indiana purchased the second order of steel ties manufactured by the International Steel Tie Company in 1911. This type of tie has been used in reconstruction work ever since. The results obtained on our lines after these years of service leave little doubt as to the merits of steel tie construction.


1:5 Cement and sand cushion
Paving brick to be grouted with 1:2 cement and sand and to be ¼" below top of rail
7" Rail
Clip
¾"
1:3:5 Concrete
1" Cushion
8'-0"

Standard Track Construction of the Union Traction Company of Indiana

The accompanying illustrations show examples of this type of construction in Anderson, Muncie, Indianapolis and Newcastle. The joints shown on Meridian Street and on Main Street, Anderson, were built in 1911, and are the oldest tracks that we have with steel ties. Both have been subjected to unusually heavy wear, as is shown by the number of wheel passes in the accompanying table.

An accurate record has been kept of the number and type of cars passing each of the points under consideration. From this it has been possible to calculate the number of wheel passes and the tonnage to which each joint has been subjected.

The other illustrations show joints built at various times between 1911 and the present date. Other track with steel ties has been built by the Union Traction Company during this period, but that shown is typical. Some has been built each year and the examples pictured are of various ages. None of the track shown, nor any of this type of construction on our property, has cost anything for maintenance since it was installed. These illustrations show what steel tie track will do, and that this type of construction requires a minimum of maintenance.

Users of the International steel tie are probably agreed that it gives the best results when placed in concrete. The track foundation then becomes a reinforced concrete beam in which the wheel loads are transmitted through the rail and the tie. There must be entire and perfect contact between the concrete and the steel reinforcing if the desired results are to be obtained. Where this principle has been closely adhered to there have been no joint failures attributable to the type of construction.

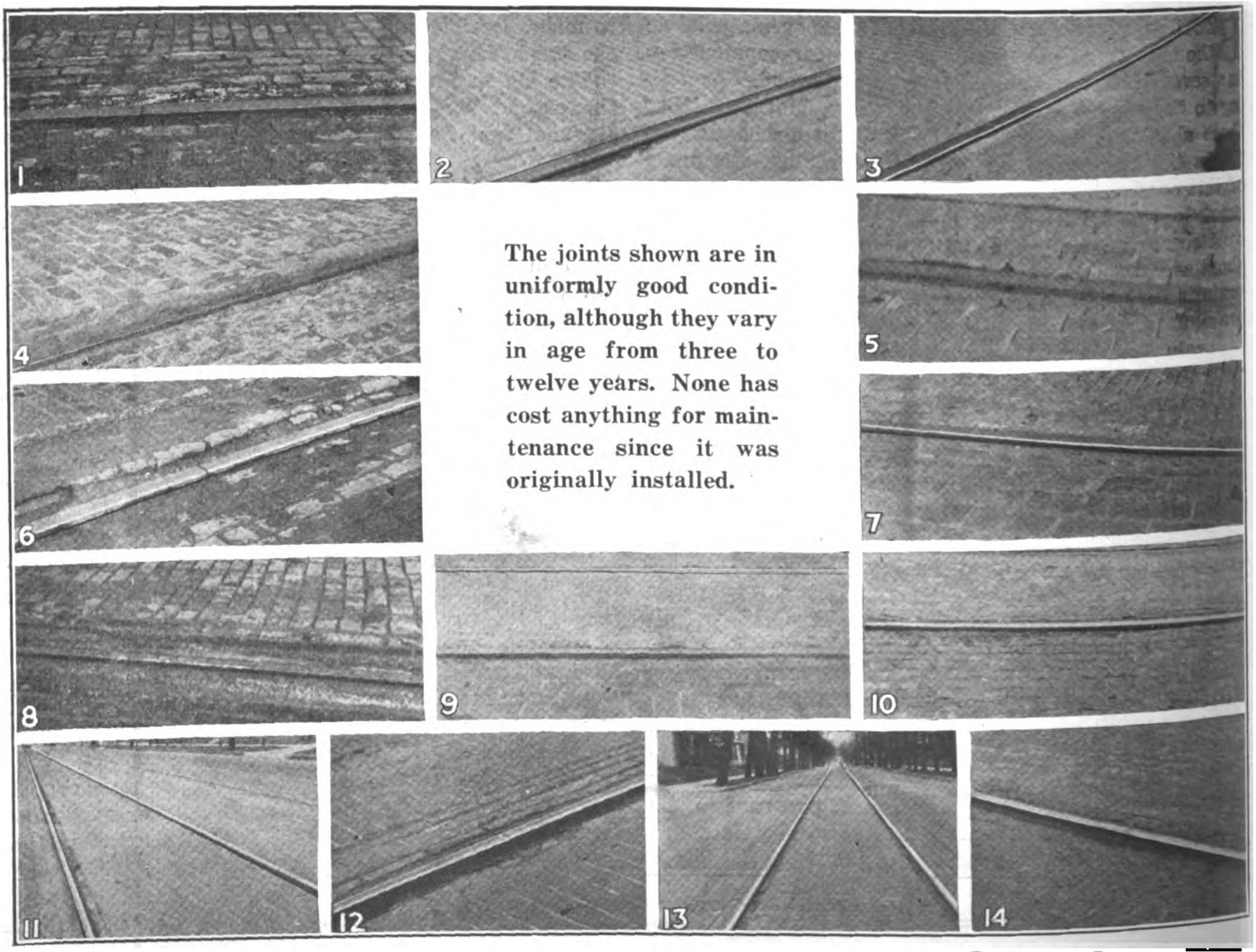
The standard all-steel track construction of this company is with 7-in. 91-lb. girder rail. A foundation of 8 in. of concrete is placed below the tie. Each joint has a steel tie under it, and plain joint bars bolted with six 1⅛-in. machine bolts, driving fit. Each pair of twin ties is placed 3 ft. from the adjacent pair, thus giving an even spacing of ties throughout.

DATA OF CAR AND WHEEL PASSES PER JOINT

Illustration Number	Location	Year Built	No. Cars Passed		No. Wheels Passed per Joint	Total Weights in Tons	
			Interurban	City		Average per Wheel	Per Joint
1	Meridian St., Anderson	1911	268,800	957,840	2,990,880	4.5	13,458,960
2	Main St., Anderson						
3	So. Meridian St., Anderson	1916	....	434,350	868,700	4.25	3,691,975
4	Third St., Anderson	1917	....	153,300	306,600	4.25	1,303,050
5	East Lynn St., Anderson	1918	....	306,600	613,200	4.25	2,606,100
6	Howard St., Muncie	1911	144,540	621,960	1,822,080	4.5	8,199,360
7	So. Walnut St., Muncie	1912	104,390	546,040	1,509,640	4.5	6,793,380
8	So. Walnut St., Muncie	1913	94,900	....	359,600	5.0	1,798,000
9	College Ave., Indianapolis	1912	251,910	134,320	1,544,920	4.2	6,488,664
10 & 11	College Ave., Indianapolis	1917	130,152	134,320	1,057,888	3.8	4,019,974
12 & 13	Twelfth St., Newcastle	1913	109,500	....	438,000	5.0	2,190,000
14	College Ave., Indianapolis	1920	....	....	....	....	.....

An unusual feature of the construction is that the paving between the rails is slightly concave, insuring the collection of moisture in the hollow in the center of the track. The hollow is drained at intervals by connection to an underground pipe. This construction is useful in keeping water from entering between the rail and paving.

The material used for ballast and paving in the standard construction of this company, per linear foot of track, has been calculated as follows: 35.52 paving bricks; for the cement grout, 0.0105 cu.yd. of sand and 0.0355 bbl. of cement; for the sand cushions, 0.032 bbl. of cement and 0.0236 cu.yd. of sand; for the concrete ballast, 0.2536 bbl. of cement, 0.1155 cu.yd. of sand, and 0.1915 cu.yd. of gravel.



The joints shown are in uniformly good condition, although they vary in age from three to twelve years. None has cost anything for maintenance since it was originally installed.

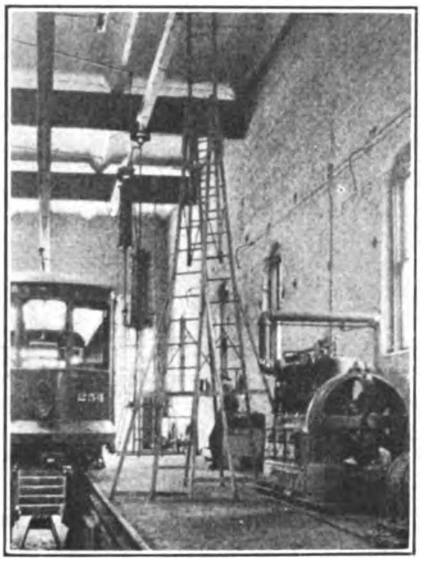
Equipment Maintenance Notes

A Safe High Ladder for the Shop

IN THE overhauling shop of the Chattanooga Railway & Light Company, Chattanooga, Tenn., an ingenious substitute for the ordinary extension ladder is used in connection with operations such as the oiling of hoist trolleys, etc., which require high climbing.

This is a collapsible structure made of two 16-ft. ladders 18 in. wide and one 10-ft. ladder 14 in. wide, put together as shown in the accompanying illustration.

The two large ladders are held together at the top by means of a strap hinge on each side, the ends being spaced sufficiently wide apart to permit the smaller ladder to slide between them. The width of the base of each large ladder is increased by means of a braced strut attached firmly on each side, widening the base to about 6 ft. A pair of steel folding braces attached to the sides of the ladders about one-third of the way up from the bottom permit the two ladders to be stretched apart about 8 ft. to form a stable footing.



Where Overhead Work Is to Be Done in the Shop a Ladder Like This Should Prove Useful

This picture, taken in the shop of the Chattanooga Railway & Light Company, shows in the foreground the motor-compressor which supplies air for shop uses.

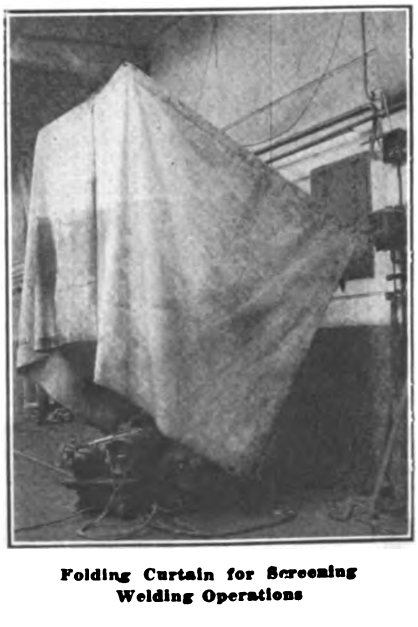
The smaller ladder hangs between the upper ends of the big ones on steel straps hooked under the bottom round of the small ladder and over a pair of rounds of the large ladders, depending upon the height of extension desired.

This self-supporting extension ladder is amply substantial, although light, and workmen use it with entire confidence from the standpoint of safety.

A Folding Welding Room

WELDING rooms should be so located that work can be handled conveniently and without the necessity for transporting the equipment to be welded over long distances. Sometimes little space is available in the most desirable location, but this difficulty has been overcome at the Fairview shops of the Lehigh Valley Transit Company, Allentown, Pa., by the plan shown in the accompanying illustration.

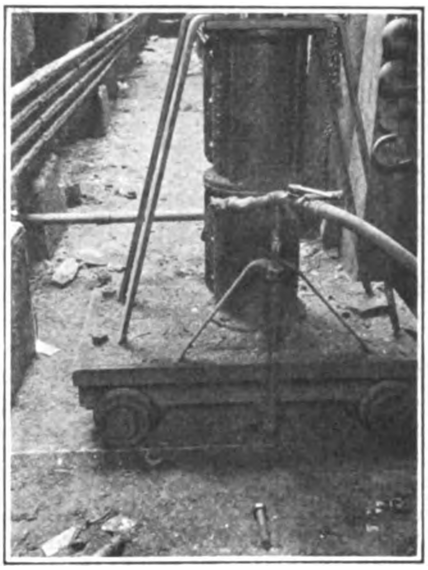
The space used for welding is surrounded by a canvas curtain mounted on a $\frac{1}{2}$-in. pipe framework. This framework is hinged at the wall, and a rope attached to the center of the front side and passing over a pulley on the wall permits the raising and lowering of the framework with the canvas. By this method space occupied by a track is used for welding work, and whenever it is necessary to operate cars over the track the curtain is folded back to give clearance. Two rooms of this nature are provided at the Fairview shops, one for acetylene welding and the other for electric welding.



Folding Curtain for Screening Welding Operations

Pit Jack Made from Air Brake Cylinders

THE increasing use which is being made of air in the performing of mechanical operations around electric railway shops is indicated by the larger number of manufactured and locally built devices everywhere in evidence. A pit jack which was put together in the overhauling shop of the Terre Haute Traction & Light Company, Terre Haute, Ind., illustrates this tendency.



This Pit Jack and Transfer Truck Are Used in Connection with Compressor Maintenance in Terre Haute

It consists of two air-brake cylinders, mounted one above the other to give the desired lifting range. The lower one is bolted to the platform of a small truck. The upper cylinder is clamped down on the lower by means of long bolts which pass through a plate on top of the upper cylinder and down below the upper flange of the lower cylinder. The plate serves as a closed end for the upper cylinder and also as a bearing for the plunger or piston rod. On the top of the rod is a small table (not visible in the picture) on which compressors are lowered from a car body and transported to the overhauling bench.

The air cylinders are held firmly in place by means of four flat steel braces which are bolted to the truck floor as shown. The air pipe leading to the bottom of the lower cylinder is supported by a brace also fastened to the truck floor.

The truck rolls on a cross track, the car from which a compressor is to be removed or on which one is to be placed being "spotted" at the proper point over the jack.

An Almost Frictionless Air Hoist Rigging

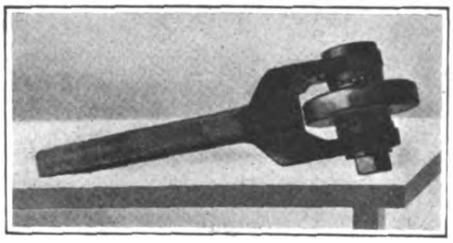
A SUCCESSFUL plan for supporting air hoists in such a manner that they can be moved freely in any direction is one in use in the overhauling shop of the Columbus Railway, Power & Light Company, Columbus, Ohio. It involves the use of two circular trolley tracks of I-section, mounted side by side under the roof trusses, the two together practically covering the shop width.

Two radius bars, also of I-section, travel around each circle, one end of each bar being carried on the circular track by means of a trolley, the other end being pivoted at the center of the circle. An air hoist is suspended from each radius bar on a trolley similar to the one previously mentioned.

At first a roller trolley of the type common in the electric railway shops was used on this hoist mounting, but was found to work stiffly on the circular track. The Chisholm-Moore roller bearing trolley shown in the illustration was recently substituted for it, and has proved well adapted to running on the curved track. The mounting is now practically frictionless.

Lathe Tool for Rolling Journals

LIKE many other electric railways, the Indianapolis Street Railway has found the rolling of axle and other journals to be a satisfactory procedure in the shops. The design of the rolling tool differs with the ideas of the master mechanics on different properties, but all will agree that the one illustrated above is a good design. At least it has been found so in Indianapolis.


Any Good Toolmaker Can Reproduce This Convenient Device for Rolling Axle and Other Journals

The roller in this lathe tool is about 3 in. in diameter, and ½ in. wide across the face. It is made of tool steel, hardened and highly polished. The rolling surface is rounded at the edges, one side being given a sharper curvature than the other, so as to provide a variety of curvatures. On each end of the roller hub a circular raceway is turned as part of a ball bearing.

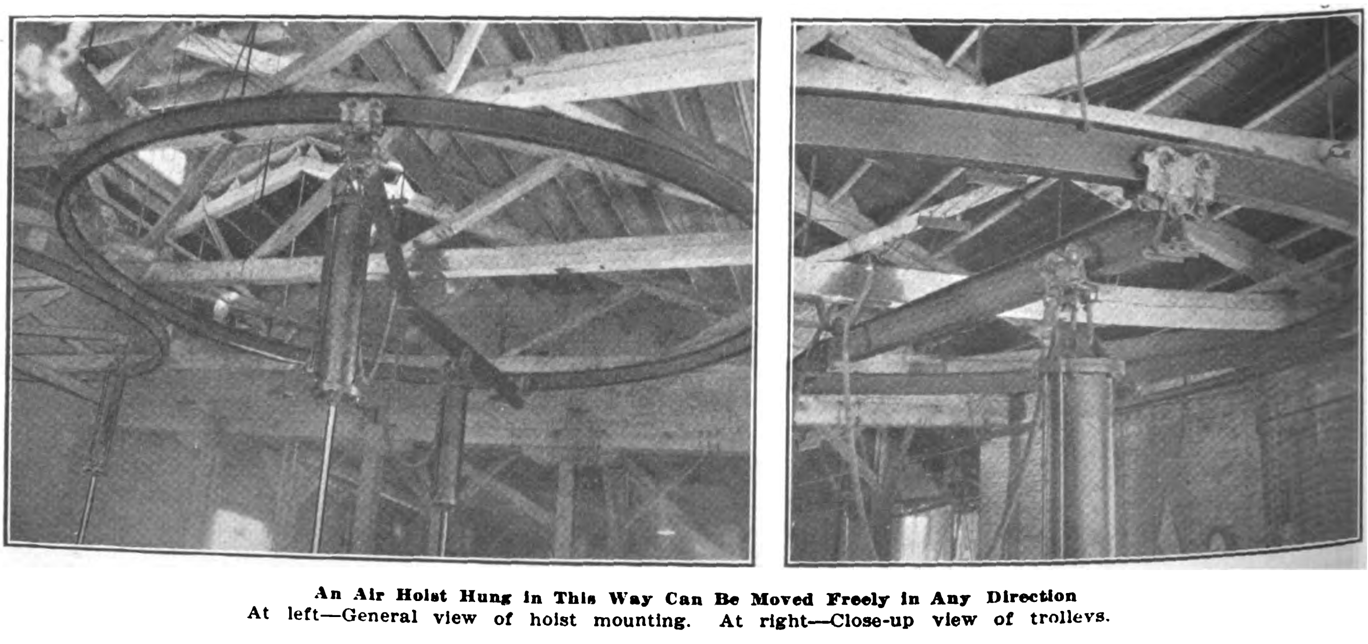
The roller is mounted in a steel holder of which one end is a shank to fit into the lathe toolpost and the other is forked to straddle the roller. A steel arbor passes through the tines of the fork and carries a pair of stationary ball-raceways. The balls which run in the raceways are about ⅛ in. in diameter.

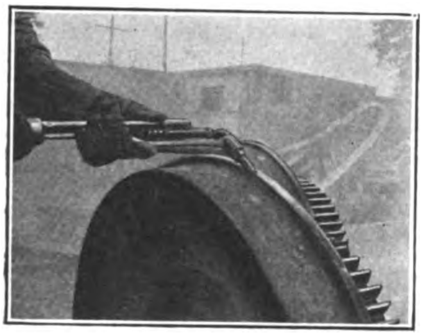
The characteristics of this tool which commend it are its simplicity, the frictionless mounting of the roller and the ease of adjustment of the bearings. As to the rolling of journals as an everyday proposition, J. F. Elward, master mechanic of the Indianapolis Street Railway, is enthusiastic for it, claiming that it produces an excellent wearing surface on the journals. In his shop tool marks are not removed by means of emery cloth, but the rollers rolling on a well-oiled journal surface easily eliminate them.

"Gas Turning" Successful at Terre Haute

THE Terre Haute Traction & Light Company, Terre Haute, Ind., is getting very satisfactory mileage out of steel wheels. In interurban passenger service 34-in. wheels with rims 2½ in. thick and 3-in. treads are giving well over 350,000 miles on the average. Some 36-in. wheels have made more than 400,000 miles. The wheels used are of the three-wear type, but they are not lathe-turned. Instead a "thick flange" is cut down by means of an acetylene torch, while a thin flange is built up with the electric welder.

The operation of cutting down a thick flange with the torch might properly be termed "gas turning," because when the torch is held in


An Air Hoist Hung in This Way Can Be Moved Freely in Any Direction
At left—General view of hoist mounting. At right—Close-up view of trolleys.



Rectifying Wheel Contour with the Aid of the Acetylene Torch

The torch is held like a lathe tool and the wheel is revolved slowly. Removal from the truck is not necessary.

the position shown in the accompanying illustration and the wheel is turned slowly the excess metal is taken off cleanly. In fact, the torch acts just like a cutting tool and it is remarkable what a smooth surface is left after the operation. The thin flanges are built up with "rail-ox" steel, which gives a fine, hard flange surface.

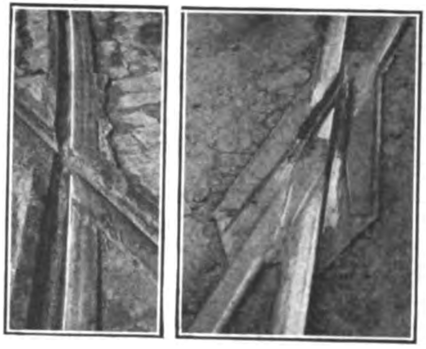
This is no experiment at Terre Haute, as it has been in use for many months and most of the steel wheels in interurban service as well as the smaller steel wheels used on the safety cars in the city have been treated by this process. The reason for the securing of such large mileage is that the metal ordinarily turned off to give a desired flange contour here is utilized in wheel service.

In general the action of the brakeshoes is sufficient to smooth out the contour of both cut-down and built-up flanges, but occasionally emery brakeshoes are used to facilitate this.

The cost of the gas torch operation and the building up of the flanges is between three and four dollars per wheel, including labor and materials and the removal of the truck and replacement under the car. The work is done on two wheels simultaneously without removal of the wheels from the trucks.

Cast Steel Used in Making Special Trackwork

THE accompanying illustrations show some frogs made in the shops of the Lehigh Valley Transit Company, Allentown, Pa., by use of cast steel from its electric furnace. In the construction of the frogs standard rail sections are used. These are cut to shape with the acetylene torch. The edges are then welded at spots, to hold them in position, and a steel plate is placed underneath. When thus assembled, the frogs are placed on a layer of sand on the foundry floor and a mold box is built around the various sections. Molten steel from the electric furnace is next poured in to make the section desired, and finally the grooves are ground out.



Good Service from Cast-Steel Frogs

The frog at the left, which is held together with cast steel, has been in service two and one-quarter years.

At the right is shown a cast-steel frog at Central Park, Allentown, Pa., in service one and one-half years.

One of the frogs illustrated has been in service two and one-quarter years at a point of heavy traffic at the corner of Seventeenth and Turner Streets, in Allentown. The frog in the second illustration has been in service about a year and a half. Sixteen frogs of this design are now in service in Allentown. The company finds that this method of building up frogs eliminates all loose centers, which are a frequent source of trouble.

Finding a Solution for the Pull-In Problem

General Manager, Dissatisfied with Record Made By Local Company, Puts Matter Squarely Up to Department Heads—Calls for Quick Results

◆

WM. REDFIELD, general manager of the Jinxville Electric Railway, is of a cheerful disposition, but his face wore a forbidding frown last Monday morning as he studied the record of car pull-ins for the preceding week. "The place for a car is on the street, giving service," he muttered, "not in the barn, laid up for repairs. We've got to do something about this." Then calling Riter, his clerk, he said sharply, "Charlie, ask Gainway, the superintendent; Jones, the machine shop foreman, and Fairweather, the roadmaster, to come here for a short conference."

"What's wrong, chief," said Bill Jones, the first arrival as he caught the frown on Redfield's face. "Nobody sick at home, I hope."

"No, they're all well enough; but it's this pull-in record that bothers me. A pull-in last week for every 2,000 car-miles. No wonder the barn is full and we have trouble in maintaining our schedules."

"A lot of them don't mean anything, Chief; our motormen often pull in a car just because they don't like it. The inspector reports it 'O.K.' and it goes right out again. Here's Gainway, he can tell you about it."

"Talkin' about pull-ins? Well, there are too many of them, but they are mostly for trifles," replied Gainway. "A worn motor brush, loose controller finger or tight brakes. If you fellows in the shop did your work right they wouldn't happen."

All of the men whom he called having arrived, Mr. Redfield put up to them what they could do to improve the pull-in record. "Do you know," he said, "I heard the other day about a road that makes over 20,000 miles per pull-in, ten times as good a record as ours?"

"That's some record, Mr. Redfield," said Gainway, "it looks queer to me. Maybe they can do it; maybe they can't. And a big mileage per pull-in doesn't mean a correspondingly low maintenance cost, either. Of course, I'm not arguing that a good pull-in record isn't a good thing. It is, all right, but that's not the whole story."

"I agree with you, Bill," said the G. M., "but all the same I think we can do better."

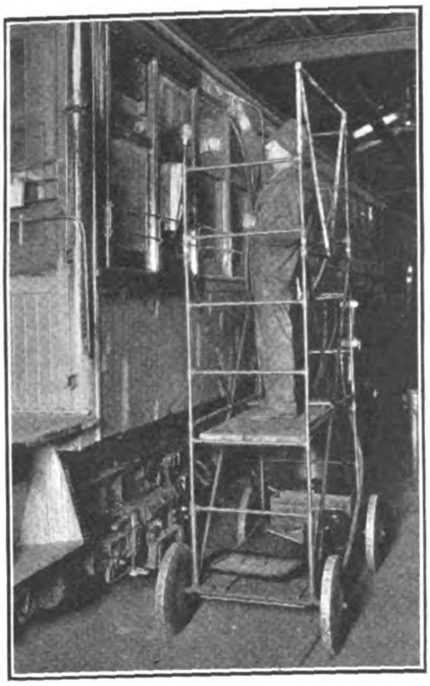
"That reminds me, Mr. Redfield," said Jones, "that I heard of a car barn where they allow each inspector a bogie of a certain number of pull-ins per month for the part of the equipment he looks after. They post the record every month. The same road, I understand, sends out a repairman to fix little troubles on the road. Not a bad idea, I'll say."

"What you fellows say shows the need for all the departments to pull together instead of passing the buck all the time," said Redfield. "It's purely a co-operative proposition.

"Get your heads together, fellows, and see if you can't get control of this pull-in business. When I took charge here late last year you promised to help me get this property into a condition such that we could show a little profit for 1923. Here's one way you can help. Meet me here at the same time next Monday and show me some results. Do you get me?"

Movable Platform for Spray Painting

THE accompanying illustration shows a pipe-work platform mounted on wheels, which is used for spray painting at the Thirty-ninth Street shops of the New York Rapid Transit Corporation. This platform is built of ⅜-in. and ½-in. pipe and has a ladder construction at each end. Planking is arranged to fit in and can be supported at the various rungs of the end ladders. With the exception of two pipes forming an X and a cross-support, the front side is open so as not to interfere with the work of the painter. The entire scaffolding is mounted on four sheet-iron wheels. These are welded and give a very light construction. The tank for paint spraying and the necessary valves are mounted at the end of the pipe framework.

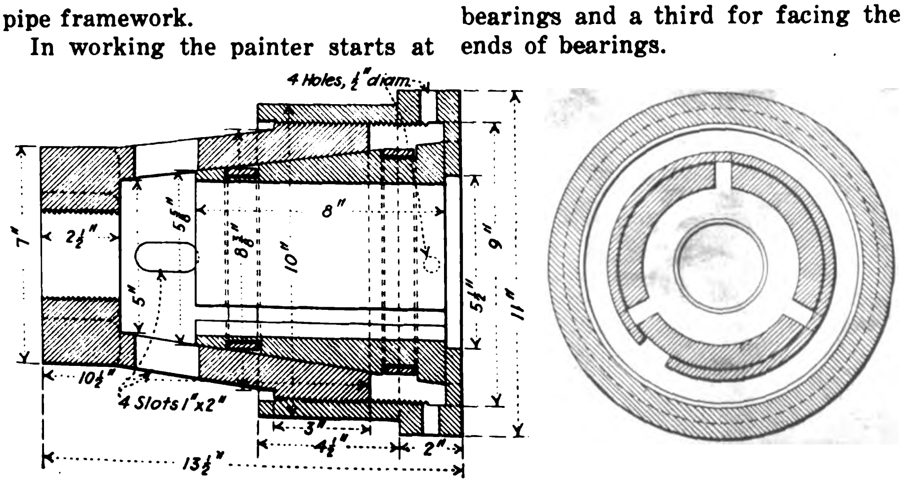

Convenient Pipe Scaffolding Mounted on Wheels for Spray Painting

In working the painter starts at one end of the car and pushes the scaffolding along as he progresses. It is thus unnecessary for him to get off the scaffolding until he has completed the strip of the side of the car that he is working on. At the shops of this New York company, the general practice is to paint the sides from the roof down to below the windows from one position of the scaffolding. The part of the car body below the windows is painted from the shop floor, and the roofs are painted by placing the boards on which the painter stands on a higher support of the pipe framework.

Handy Armature Bearing Chuck

A SELF-CENTERING chuck that is a time and labor saver is used in the shops of the International Railway, Buffalo, N. Y., for holding armature bearings while they are being machined. This chuck consists of a taper housing with collapsing split sleeve. The International Railway uses five sizes of these sleeves to accommodate the different sized bearings. These have inside dimensions varying by ½ in. from 3 in. to 5 in. The sleeve is split into three parts and is held together by two ¼-in. x 1-in. steel rings. By screwing the front portion of the chuck the split sleeve is forced inward against the taper of the housing and thus clamps the bearing and at the same time centers it.

The chuck is threaded at the back end, so as to screw on to the headstock of the lathe. Four slots 1 in. x 2 in. in size are provided for tightening the chucks, and these slots also serve as an outlet for the babbitt chips when the bearing is being machined. The tool post is fitted with three tools, one for turning large bearings, one for small bearings and a third for facing the ends of bearings.

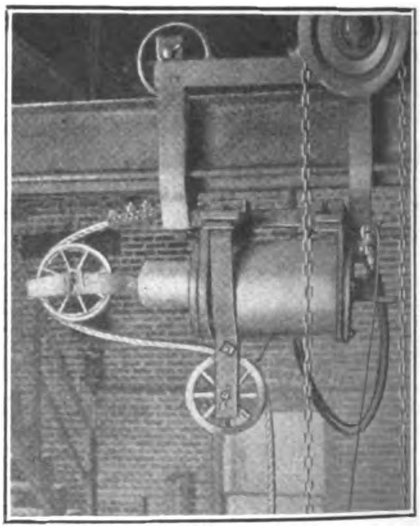


Self-Centering Lathe Chuck for Armature Bearings

Air Hoist Made from Air Brake Cylinder

AMONG the many types of hoists which are found in electric railway shops, one of the most interesting is a home-made affair built and used successfully in the machine shop of the Newport News & Hampton Railway, Gas & Electric Company, at Hampton, Va.

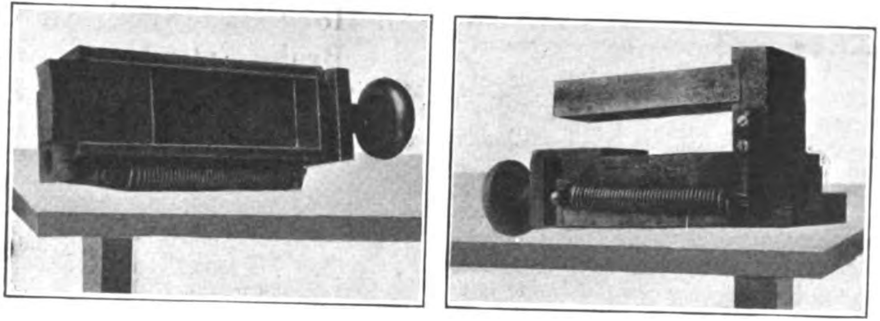
An air-brake cylinder is hung from a trolley which runs on the base of an inverted rail suspended possibly 15 ft. from the floor. The plunger carries a grooved sheave mounted in a bearing made of strap iron. Below the cylinder is a second sheave mounted on a strap-iron support as shown in the accompanying illustration.


This Simple Air Hoist Is Made Largely of Waste Material

A steel cable is attached to the trolley and passes around the two sheaves in such a way as to permit it to hang below the middle of the trolley. The method of connecting the cable over the two sheaves gives it a lifting range of twice the travel of the plunger.

The trolley is made of 3-in. strap iron, carrying 6-in. rollers. The frame is fabricated so as to permit the cylinder to be mounted under it as under a car. The air hose which feeds the cylinder drops from above in a long loop so as to permit considerable travel of the hoist along the rail. Movement along the rail is controlled from the floor by a chain passing over a sheave mounted on the end of one of the roller axles.

While the range of this device is not large, it serves its purpose as it is used principally for hoisting parts from the floor to a truck. It will raise a half ton a couple of feet without difficulty.



Lathe Tool Used for Grinding Commutators in Indianapolis Street Railway Machine Shop

At Left—Tool in position as used in lathe. At Right—Tool laid on its side to show details of spring connection and shank for mounting in lathe-carriage tool-post.

Grinding Tool for Lathe Insures Good Commutator Finish

IN GRINDING commutators one problem is to insure a uniform pressure of the grinding stone against the commutator surface. This problem has been solved in the shops of the Indianapolis Street Railway by the construction of a lathe tool in which the carborundum block is pressed against the commutator by a spring, in the fashion shown in the accompanying illustration.

The tool consists of two principal parts: One that may be termed the body, to which is attached a shank to fit in the tool post of the lathe, and the other the grinding block holder, a shell in which the grinding block is held by friction, being driven into place.

The block holder slides on the body, being held in proper relation thereto by means of a dovetail mortise and tenon. This arrangement, with the rubbing surfaces properly lubricated, permits the block holder to slide backward and forward, the block holder being pulled outward or toward the commutator by means of a steel spring. A circular handle permits the block to be pulled away from the commutator without disturbing the position of the tool carriage.

Commutators are polished with this tool after they have been undercut.

New Equipment Available

Electric Glue Pot for Railway Shop

THE maintenance of railway equipment includes a number of operations which require heated glue. Realizing that there are many cases where the heating of glue pots by gas or fire may present an extreme fire hazard, the Westinghouse Electric & Manufacturing Company has developed a line of electric glue pots. These may be used for heating materials with low melting point, such as paraffin and beeswax, as well as glue.

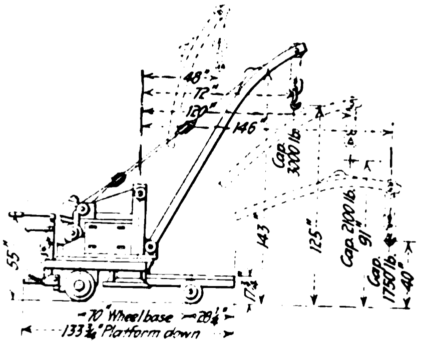
Some of the advantages claimed for the electrically heated pots are that the expense of operation is less than for other types and that they furnish a uniform and reliable heat.

The type of electric glue pot now being marketed can be fitted with rheostatic control to give a wide range of temperature. Through its use it is possible to regulate the heating of the glue so that it will be suitable for the particular type of work being undertaken. Electrically heated pots are portable and thus they can be ready for use wherever the work may be located, as the plug for the extension line can be shifted from one outlet into another.

The Glue Pot Is Portable and Keeps the Temperature Uniform

New Type Crane Truck

A NEW three-way crane truck has been developed by the Baker, R. and L. Company, Cleveland, Ohio, which is of particular interest due to the power swiveling attachment provided. This feature increases the utility of the machine, and enables the driver to operate it with ease. The type DYAQ crane has a capacity at 6-ft. radius of 3,000 lb. It weighs 7,000 lb. without battery and has a travel speed of 6 m.p.h. without load. The hoist is driven by a single totally-inclosed motor of 24-volt 60-amp. rating at 1,000 r.p.m. Power is applied to either drum by means of magnetically operated friction clutches. This makes the change from one drum to the other very smooth, and the construction is such that the drum which is not working is firmly held by a large-sized brake.



Dimensions and Lifting Height of New Three-Way Crane

The slewing unit is pillar mounted and turns on ball bearings. Power is transmitted from the slewing motor through a worm and spur gear. The slewing motor is compound wound, totally inclosed, and has a rating of 24 volts, 32 amp., and 1,700 r.p.m. Control of the slewing motor is by means of a drum-type reversing controller mounted on the dash. Limit switches are provided for automatically controlling the hoisting and reverse motions of the boom, the hoisting motion of the load hoist and slewing motion.

The boom is fabricated from structural steel and can be made to any length which is required within reasonable limits.

The News of the Industry

Shore Line Revived

Line Opened Between New Haven and Guilford After Being Shut Down Four Years

Cars began operation on July 17 between New Haven and Guilford, Conn., on the New Haven & Shore Line Railway, a part of the former Shore Line Electric Railway. The new company, under the direction of William A. Sperry, consulting engineer, New Haven; the Blakeslee Brothers, and others, has purchased that part of the old Shore Line system between New Haven and Saybrook and has rehabilitated the line between New Haven and Guilford. Very little work was required as the original construction was good. The line between Guilford and Saybrook will gradually be opened.

Altogether the new company owns about 35 miles of track, laid with 70-lb. T-rail on ties 2-ft. centers and supplied with a catenary overhead line. A large part of the road is on its own right-of-way. Power for the present is being supplied by the Connecticut Company from station A in New Haven, and until its new cars arrive from the Wason Works the company will use cars leased from the Connecticut Company. The new cars will be double-truck, with a single operator. There is a substation at Guilford and a second one is being built near North Branford. The voltage will be 650.

On July 16 a special party of about 125 took three cars from New Haven as guests of the company. On their trip they found a good deal of rejoicing over the opening on the part of those along the way. At Guilford a collation was served in the carhouse, and speeches were made by Mr. Sperry, Mayor Fitzgerald of New Haven, L. S. Storrs and others. Mr. Sperry also introduced the new general manager, William Walker.

The F. E. Kingston Company, New Haven, is acting as banker in connection with the road. The bond issue is $500,000, of which $400,000 is to be sold, the stock issue being $400,000. New Haven business men and residents of the territory served are among the supporters of the project.

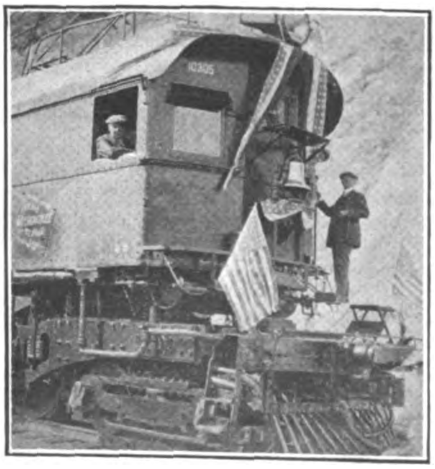
As indicated previously this 33-mile stretch of railway, providing connections from New Haven to Madison, Guilford and Saybrook, was formerly part of the Shore Line Electric Railway and, with lines running to Norwich, Stonington and Westerly, made up a system of 134 miles, part of which has been in disuse for several years.

The new company now operating the road is giving hourly service for the greater part of the day, with more frequent service when the traffic is especially heavy, as during week-ends and holidays. The growing summer resort interests along the route call for such a service, and stone quarries are expected to yield a paying freight business.

Wage Testimony All Presented in Chicago

Presentation of testimony in connection with the arbitration of the wage dispute between the union employees on one side and the Chicago Elevated Railroads and Chicago Surface Lines on the other was completed during the week ended July 14. It was stated that a decision would probably be announced on July 21. The wage scale to be decided by the arbitration board will be for two years, dating back to June 1, the date on which the former wage agreement expired. The arbitration board began hearing testimony on July 9 and daily sessions have been held. The cost of living has been the chief subject of discussion and testimony of witnesses. The men now receive 70 cents an hour. They are demanding an increase of 10 cents an hour.

President Rides in St. Paul Cab



President Harding had the unusual experience of riding in the cab of an electric locomotive of the Chicago, Milwaukee & St. Paul Railway in his recent Western trip. He had as his guide H. B. Earling, Western vice-president of the Chicago, Milwaukee & St. Paul Railway, shown on the pilot of the locomotive in the accompanying engraving. In commenting on his experience the President said that the electrification was the most stupendous undertaking of the kind he had ever seen.

Official Reports on Strike

Industrial Commissioner Who Inquired Into Schenectady Strike Wants Greater Voice for People

Sweeping changes in the present method of managing public utilities in New York State, a direct outgrowth of the strike on the Schenectady Railway, and a reflection as well, of the prolonged Albany strike, are recommended in the report just submitted to Governor Smith by Bernard L. Shientag, State Industrial Commissioner, reviewing the Schenectady situation. Mr. Shientag urges three radical departures from the existing system of managing street railways:

1. Representation of the people of the localities concerned on the directorates of street railways.
2. Legislation that will give the people, who are the most vitally interested, a greater voice in the control and regulation of public utilities.
3. Legislation that will delay strikes until an impartial tribunal has made a public investigation and endeavored to settle controversies between the employees and the companies.

Commissioner Shientag places full responsibility for the Schenectady strike deadlock on the fact that no member of the board of directors of the Schenectady Railway is a resident of Schenectady and that the directors themselves are split fifty-fifty on the proposition of recognition of the union.

The situation on the board of directors, the announcement by Commissioner Shientag said, has driven him to the conclusion that the only remedy against a recurrence of the Schenectady situation is to open a way for a voice of the public in avoiding similar troubles in the future.

From the inquiry conducted in the Schenectady strike situation it developed that the Schenectady Railway was owned jointly by the Delaware & Hudson Railroad and the New York Central Railroad, each of the companies having six representatives on the board of directors. Commissioner Shientag said the New York Central group of directors favored recognition of the union, while the Delaware & Hudson directors refused to recognize the union and would deal with the striking employees only as individuals.

Commissioner Shientag said:

> The attitude of the Delaware & Hudson interests in the Schenectady Railway strike is complete denial of the right of collective bargaining. As the situation has developed it is no longer a question of entering into contract with the union, but the question that is presented to us is whether or not the union shall be destroyed.
>
> The present attitude of the management of the company is that there is no strike—that the strike is over. Anyone in the streets of Schenectady will testify to the contrary.
>
> The New York Central Railroad, through its directors represented on the board of

the Schenectady Railway, has taken a progressive stand on some of the questions involved in this strike. Declarations alone, however, will bring no results to a suffering public. The New York Central, being the one-half owner of this property, cannot escape the responsibility which such ownership carries with it. The fact that there is a conflict of views among the directors of the Schenectady Railway can afford but little satisfaction to the people of Schenectady.

The function of the State Department of Labor with reference to a strike or industrial controversy, says Mr. Shientag, is threefold:

1. To attempt to avert the strike before it takes place.
2. To use its endeavors to bring about a settlement of the strike after it does occur.
3. To investigate the causes of the strike and to bring the facts to the attention of the public to the end that the force of enlightened public opinion may succeed in bringing the parties together where other means have failed.

He then went on to explain that neither the labor department nor any other state agency has any power of compulsion in an industrial dispute, and continued with a brief discussion of the economic effects of a strike.

In making his recommendations to minimize the danger of future strikes, Commissioner Shientag declared that in little more than two years trolley strikes in Albany, Troy, Schenectady and Buffalo have cost the traction companies more than $10,000,000 and caused tremendous losses to the traveling public and to business interests.

The significance of the state's efforts to settle the Schenectady dispute spread beyond the confines of the area affected when Commissioner Shientag called William K. Vanderbilt, director of the New York Central, and Alfred H. Smith and Albert Harris, president and vice-president of the New York Central, and directors of the Schenectady Railway to testify. Their testimony, bearing principally on recognition of the union, attracted wide attention.

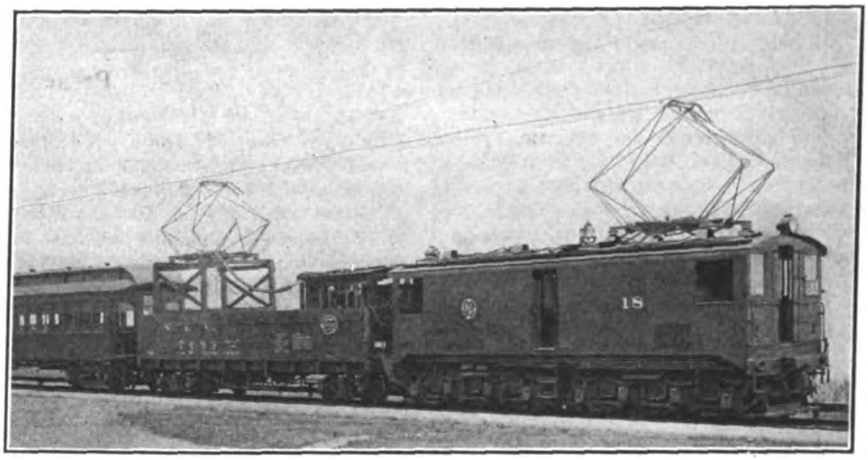
In the course of his observations the commissioner said:

> To one who has closely observed the progress of events leading to these strikes, and their aftermath, the conviction is inescapable that the citizens of a community should have a greater voice in the control and regulation of their public utilities.
>
> After all, the public attitude determines to a large extent the success or failure of public service corporations, like street railways. If recognition is to be given to the oft-expressed declaration that in a situation of this kind the public interest is paramount, public service corporations may well consider the advisability of having on their boards of directors one or more disinterested persons to represent the people of the community, to reflect their views, to keep the board informed of local conditions and to be in position to foster that spirit of equity and fair dealing between the company and its employees without which neither can prosper.
>
> In the future, such public representation on the directorate may well be written into contracts entered into between public service corporations and local communities involving the use of the public highways. Public representatives on such boards may be in a position to give expression to the public needs and public welfare, frequently lost sight of by both parties in these controversies.
>
> There may well be considered also the advisability of enacting legislation providing that in the event of a declaration of a strike on a public utility it shall not become operative until a short fixed period intervenes, during which time an impartial tribunal shall make a public investigation of the facts and endeavor by mediation to bring about an adjustment of the difficulties.

New Overhead Tested

Large Values of Electric Current Can Be Successfully Collected for Heaviest Traffic Possible

A new type of overhead trolley construction has been developed by the General Electric Company for use on heavy traction electric railways. A demonstration was made on the tracks of the General Electric Company, at Erie, Pa., on July 16, 17 and 18, before a group of railway executives, engineers and operating men. These public trials were for the purpose of showing that the new type of overhead construction can be used successfully for collecting current, either direct or alternating, for handling the heaviest railway traffic that can be anticipated in the future. A new record for current collection of more than 5,000 amp. was set up. This is considerably more than twice the amount of current now collected for normal requirements. It was done at speeds up to nearly 60 m.p.h., the current and speed apparently being limited only by the ability of the power supply.



Test Train Taking Current from New Type of Overhead Construction

The test train was composed of a 110-ton passenger type gearless locomotive, drawing a gondola car and a coach. Two pantographs were used, being of the type which have been employed successfully on the Chicago, Milwaukee & St. Paul electrification. The pressure of the pantograph against the wire was between 30 and 35 lb. The load was supplied by means of grid resistors mounted in the gondola car and controlled through remote-control switches located in the locomotive. By this means any load in addition to that taken by the locomotive could be imposed on the station up to the capacity of the station apparatus.

The length of the track on which the test was made is about 2⅜ miles, the greater portion of it being used for high-speed running. The overhead construction is supported by steel bridges for a portion of the way, lattice poles for another section, and poles of I-beam sections remainder of the way. The pole spacings are approximately 300 ft.

The overhead construction is of the compound catenary type. A messenger cable of steel strand is hung from insulators on the supporting bridges or pole brackets. From the messenger cable is suspended a copper feeder messenger cable by means of hangers. Two contact wires are used, for the major portion of the distance being No. 0000 grooved copper trolley wire, the remainder being No. 000000 grooved copper trolley.

The special feature is the method by which the trolley wire is suspended from the feeder messengers. This is accomplished by means of a lacing of copper cable, along the direction of the line, and fastened with clips alternately to the feeder and to one or the other trolley wire. The spacings between clips on one wire vary from 15 to 20 ft., making the clips on the feeder messenger 7½ to 10 ft. apart. By this means great flexibility is obtained.

A number of observation towers were erected at a height approximately that of the top of the pantograph, so that those witnessing the tests could see the action of the pantograph moving along the wire. In the entire series of tests practically no arcing was observed, regardless of the speed or load. A complete description of the installation and the tests made will be published in a future issue.

Men Accept Five per Cent Advance

Employees of the Interborough Rapid Transit Company, New York, N. Y., recently accepted by a majority vote of 1,200 the 5 per cent wage increase offered by the company. The vote was either to accept the 5 per cent increase or else to refer the matter to arbitration. The wages range from $3.50 to $9 and $10 a day for skilled mechanics. The increase will be retroactive to July 1 and will remain in effect for one year.

The men had demanded an increase of 10 per cent. Frank Hedley, president, replied to the demands of the men by offering a 5 per cent increase. He said that even the 5 per cent rise would place an additional burden of $1,250,000 a year on the company.

Predicts 29,000,000 Population in New York in Year 2000

What traffic regulations and methods of transportation will be in force in the year 2000 might well be subjects for conjecture as well as apprehension in view of a recent prediction of the Committee on Plan of New York and Its Environs that in the year 2000 the population of New York would be nearly 29,000,000.

It believes that the negro population will be triple the present quota and that there will be a substantial decrease in the percentage registered in the foreign-born element. This conclusion was reached after a statistical study of the population undertaken by Professors Pearl and Reed of the School of Hygiene and Public Health of Johns Hopkins University.

The area under scrutiny was called the "New York Region" and comprised a territory of more than 5,500 square miles in New York, New Jersey and Connecticut. The present population in that area is roughly estimated at 9,000,000.

The forecast for the area in round figures is as follows:

1930	11,500,000
1940	14,100,000
1950	16,800,000
1960	19,600,000
1970	22,300,000
1980	24,800,000
1990	27,000,000
2000	28,800,000

The scientists in a booklet giving their prediction disclosed in detail the complicated mathematical processes by which they arrived at their results.

F. P. Keppel, secretary of the Committee on Plans of New York and Its Environs, says that it is interesting and significant to note that the forecasts by Professors Pearl and Reed for a considerable period into the future, up to 1970 at least, a limit which provides ample latitude for the present regional planning project, are in quite close agreement with those worked out by Nelson P. Lewis as a part of his physical survey of the region for the committee, as well as those made by at least one important public service corporation.

No Increase in Philadelphia This Year

According to a plan recently advanced by Thomas E. Mitten, chairman of the executive committee of the Philadelphia Rapid Transit Company, any excess wages to employees over the present 64-cent scale are to be diverted to the co-operative wage fund. The present wage of the Philadelphia Rapid Transit Company is based on the average of three cities, namely, Chicago, Detroit and Cleveland. Negotiations are pending in Chicago and Detroit looking toward an advance in wages and it is the intention of the Philadelphia company to keep the cash payment to its men constant by the new plan. Following the announcement by President Mitten, a resolution was adopted by the co-operative committee authorizing the company to pay any additional wages to which the men may become entitled this year into the co-operative dividend fund. It was Mr. Mitten's contention that the company could not meet another advance this year and continue the 10 per cent co-operative wage dividend.

$78,000,000 Transit Program

United Recommendations Are Made in Philadelphia for Carrying Out Work in Business Area

The engineers for the city of Philadelphia, the Philadelphia Rapid Transit Company and the business interests in the center of the retail shopping district united on July 10 upon a recommendation to the Council's Transit Commission. The recommendation as explained in the official statement and as commented upon in the *Ledger* was in two parts: First, a broad and comprehensive plan for high-speed transit development based on present needs and upon those that will undoubtedly be created by the completion of the Delaware River bridge and the possible changes in the terminal of the Pennsylvania Railroad Company, and, second, the first step for construction.

BROAD STREET PLAN UNCHANGED

Taking up the latter, "step No. 1," as of immediate importance, the engineers propose the building of the Broad Street subway substantially as planned in the program of 1914-1916, between Olney Avenue on the north and Spruce Street on the south, but with Director Twining's proposal for a subway beginning at Broad Street and Ridge Avenue, extending under the Ridge and Eighth Street to Walnut, and thence westward to a connection with an elevated line on Woodland Avenue to Darby.

"Step No. 1" forms the heart of the program, but the comprehensive plan shows also—for ultimate construction—a surface-subway under Chestnut Street, connecting on the east with the ferries and with the bridge, and on the west gathering in the surface lines now operated on Spruce Street and on Baltimore and Chester Avenues; a subway under Arch Street, with a possible future connection by tunnel with Camden and connecting with an elevated line on Lancaster Avenue to Overbrook, and a subway under Filbert Street connecting with the bridge, at the east, and with the Parkway-Roxborough line at the west.

The engineers in their report estimate the cost for construction and equipment under "step No. 1" at $78,000,000, of which sum about $31,000,000 is or can be made immediately available out of the loans already authorized. It is understood that the city's unused debt limit will permit the borrowing of the additional amounts needed to carry through this initial unit.

Canadian Pacific Electrification Rumored Again

Plans for the electrification of the Canadian Pacific Railway's main line through the Rocky Mountains, or, at least, those sections where the existing grades are heavy, are expected to materialize in the very near future. Officials of the railway are discussing these plans at present, and from information given out it is confidently expected that work on the electrification will be started next year.

D. C. Coleman, vice-president of the Western lines, stated a few days ago that surveys on the water power available on the Columbia River in the vicinity of the main line are now being carried out by the company. At present there are observers determining the water power at Surprise Rapids on the Columbia River, about 32 miles south of Beavermouth. Mr. Coleman stated that for the time being the surveys were being confined to the water of the Columbia River. Mr. Coleman said traffic demands, the financial situation and other conditions would of course determine largely when a start would be made.

Safety Committee Dines and Hears About Safety Progress

Fried chicken was served to 100 employees on safety committees of the Union Traction Company of Indiana at the semi-annual dinner held recently at Anderson. A feature of the dinner was the announcement by Ross Luellen, safety engineer of the company, of the company's record for four years, during which time its cars hauled 66,800,000 persons and its interurban and city trains have traveled a total distance of 31,500,000 miles with no passengers killed.

Steam railroad crossings at grade were safely passed 11,000,000 times and there were 1,250,000 safe "meets" in sidings in interurban operation. Two billion pounds of freight and express were transported on the company's lines in these four years.

"Safety First" in Anderson has made real progress through the efforts of Mr. Luellen, who keeps before the people the subject of safety through the "Sayings of Safety Sam" and through his various addresses before the Rotarians, Kiwanians, school children, etc. He believes that each person's safety, whether physical, moral or financial, depends first and most of all on the precautions which he himself takes.

Brooklyn Elevated Case Adjourned

The hearing of Edwin Parcells, Brooklyn motorman of the Fifth Avenue Elevated train which fell from the elevated structure at Flatbush and Atlantic Avenues on June 25, was adjourned on July 17 in the Flatbush Court until July 31, to await the result of the various investigations now pending.

New York City Creates a Transit Bureau of Its Own

A permanent Transit Bureau with an appropriation of $101,700 was created by the Board of Estimate of New York City at its meeting on July 13 on motion of Mayor Hylan. All special committees acting for the board in transit matters will be discharged as soon as they report and their place will be taken by the new body, which consists of John H. Delaney, Dock Commissioner; George P. Nicholson, Corporation Counsel, and Arthur S. Tuttle, chief engineer of the board.

Mr. Delaney, as chairman of the special committee negotiating on new subways with the Transit Commission, presented a report recommending that the board approve and adopt the major portion of the commission's route for the proposed Brooklyn-Queens crosstown subway. The report also asked for sixty days extension of time for the committee's consideration of the rest of the crosstown subway and of the proposed west side subway in Manhattan. Mr. Delaney indicated that the negotiations with the commission were proceeding amicably and toward a solution of the present deadlock. The board did not act on any of the report, but extended the time of the committee for sixty days.

The new Transit Bureau received jurisdiction over all transit affairs. Among the matters which it is empowered to handle are negotiations with the Transit Commission, discussion of new routes, appropriations for the state body, and preparation of the local city administration's plans for providing new subways.

The new Transit Bureau received its first assignment when the board referred to it the problem of continuing the operation of the trolley lines of the Manhattan & Queens Traction Corporation, whose contract was declared forfeited, because of alleged failure to furnish the stipulated service. Pending the taking over and operation of the lines by Grover A. Whalen, Commissioner of Plant and Structures, the transit committee will see that there is no interruption of service. Counsel for the receiver of the line protested against the board's action, and threatened to take the matter into the courts.

Specialists to Report on New York Elevated Equipment

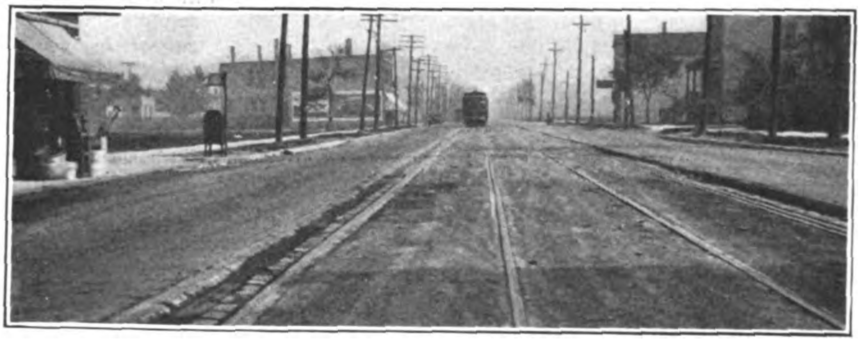
Frank Hedley, president of the Interborough Rapid Transit Company, and W. S. Menden, president of the Brooklyn-Manhattan Transit Corporation, have informed the Transit Commission that they have arranged with the General Electric Company and Westinghouse Electric & Manufacturing Company to carry out a suggestion of the commission to have engineers of those companies make a thorough survey of the subway and elevated equipment and of its maintenance. Letters from the companies to this effect were made public by Commissioner Harkness on July 12. He said:

> These letters from Mr. Hedley and Mr. Menden carry out suggestions made by the Transit Commission several weeks ago. They were made before the recent Fifth Avenue (Brooklyn) accident. The purpose of the survey is to supplement inspection of the commission's regular staff through an examination by engineers of the two companies. Their report will give us most exact and authoritative information as to present condition of the equipment used in subways and on elevated lines.

Cicero Has Peculiar Problem

Seeming Lack of Responsibility for Paving Reacts Against Railway and the Public

The Cicero Avenue line of the Chicago Surface Lines operates between Irving Park Boulevard and Twenty-fifth Street. The major portion of the line is within the city limits of Chicago, but a stretch of double track 1¼ miles long, between Twelfth Street and the southern end of the route, lies in the town of Cicero. This section has received no attention other than the ordinary maintenance necessary to operate cars for a number of years. The street on each side has recently been paved by the town, but the section of roadway maintained by the railway has remained unpaved. It is at a grade 5 in. lower than the new pavement.



View Showing Condition of Street on Either Side of Tracks

No one lays claim to this particular piece of property and yet it furnishes transportation to a major portion of the 20,000 employees of the Western Electric Company and during the rush hour is one of the heaviest cross-town lines in the city.

A number of years ago an ordinance was passed by the city of Chicago and the town of Cicero authorizing the Chicago Railways, which originally built the track, to enter into an operating agreement with the Chicago & West Towns Railway whereby it would be possible for the Surface Lines to operate its cars over the 1¼-mile stretch in the town of Cicero, the only requirement being that the Chicago Railways should maintain the track in good order.

The ordinance, however, stipulated that the company could not pay for rehabilitation work, the only allowable expenditure being that necessary to keep the track in operating condition. A 30-day cancellation clause was included in the operating agreement between the two railways.

No trouble was encountered during the ensuing years until one year ago, when the town of Cicero let the contract for paving this street on each side of the right-of-way, and raised the grade 5 in. above that of the track. The town of Cicero called upon the Chicago Railways to raise the track to grade and pave the property. It was pointed out to the town officials that by the ordinance the railway was prohibited from making any expenditure of this nature. The West Towns Railway declined to do anything. stating it was not using the track and had no objections to its being torn up. The Illinois Commerce Commission was asked to force the Chicago Railways to pave the street, but after reviewing the ordinances and the operating agreement, the commission declined to issue an order.

No further action has been taken by the town of Cicero and the condition prevailing now as to clearances permits only certain types of cars to be run over this stretch of track. Although operation may be continued during the summer and the open months of the year, it is doubtful if it can be continued during the coming winter when this sunken area will become filled with water and snow and may freeze over.

Discontinuance of the service at Twelfth Street, the city limits, will mean discommoding a large part of the employees of the Western Electric Company, which is located 1 mile farther south, who use the Cicero Avenue line as a means of getting to and from work. The adjoining pavement is already being affected by the different grade due to the heavy trucks turning in and out and breaking down the concrete.

It certainly appears as though the town of Cicero has been very shortsighted in paving before a disposition was made in regard to the paving of the tracks. With the thirty-day cancellation clause written into the agreement and the ordinances as previously stated, the railway company is not allowed under these conditions to write into its capital account an expenditure for this paving.

Deadlock in Jersey

Public Service Railway Flatly Refuses Demands for Higher Wages and Shorter Hours

After six weeks of silence, the Public Service Railway, Newark, has answered the demands presented by the men on June 1. In a statement made on July 17 to the general conference board representing the employees, Thomas N. McCarter, president of the company, said that the financial condition of the railway made it absolutely impossible to grant any increase in the wage scale at this time. He offered to throw open the books of the company for examination by the employees. Schedules, overtime payment and other similar matters were said to be as favorable to the employees as it is possible to make them.

The reply presented by the railway to the trainmen contained a complete and careful analysis of the entire situation. It was pointed out that the wage scale demanded, which is 30 per cent higher than the present one, and the other changes suggested would involve an annual charge upon the company of approximately $4,000,000. In presenting the new contract to replace the agreement which ends Aug. 1 no reason was given why these enormous increases should be made. The company showed that the present wage scale is 100 per cent higher than that which prevailed in 1913, whereas according to statistics of the United States Bureau of Labor the cost of living in New York City is now only about 75 per cent higher than it was at that time. The rate asked for, 65 cents an hour, would amount to an increase of 160 per cent over 1913. From these facts the company argues that the demands cannot possibly be justified by the cost of living.

Railway Operating at Deficit

In contrast to the steadily increasing disbursements for wages, it is shown that the owners of the property have received no dividends since 1917, but have been burdened with a deficit, which at the end of the year 1922 amounted to $1,252,288. Successful operation of the railway cannot continue, the president said, unless the capital invested is accorded a fair treatment and a return paid thereon.

In regard to working conditions, the demand is that 50 per cent of the runs shall be nine hours straight, an additional 20 per cent shall be finished within ten hours, 20 per cent more shall be finished within eleven hours and the remaining 10 per cent shall be finished in as short a time thereafter as may be possible. The company forcibly points out in its reply that any increase in the number of straight runs or the shortening of swing runs will inevitably result in an increase in tripper service. This would be expensive and annoying to the company and detrimental to the employees.

As a counter proposal the company suggests the continuation of the present agreement for another five years. In completing his statement the president mentioned the pleasant relations which have existed between the members and the management, said he hoped they would continue and expressed willingness to discuss matters further at any future date.

Meetings to act upon the offer of the president have already been held by the trainmen in the various cities served by the Public Service Railway. All of these meetings have emphatically refused to accept his proposal. The employees declare that their wages of 50 cents an hour are the lowest in the country for any similar property.

Illinois Motor Vehicle Law Revised

The motor vehicle law of Illinois has been revised in these essentials:

Reduces the maximum weight permitted on the road surface on any two wheels from 16,000 to 13,000 lb; the gross weight of a self-propelled vehicle from 24,000 to 20,000 lb., and the gross weight of a vehicle and trailer from 32,000 to 26,000 lb. Provides that tractors may be operated on improved highways if the cleats are attached in such a way as to be continuously in contact with the road surface and the weight per inch of width of such cleats does not exceed 800 lb; that freight carriers operating on the state highways pay an additional annual license fee of $1 for each 100 lb., gross weight, if over fixed routes, $3; that passenger carriers operating over fixed routes pay $3 for each 100 lb. gross weight, computed at 125 lb. per passenger; that mirrors be attached to all trucks so that the driver can see the road behind. Increases the speed limit from 30 to 35 miles an hour. Requires operators of passenger or freight carriers on the public highways to file bonds of $5,000 for each vehicle.

Puget Sound Suit Dismissed

The "specific performance" suit of the Puget Sound Power & Light Company against the city of Seattle was formally closed when the United States District Court received the mandate of the Circuit Court of Appeals ordering Federal Judge E. E. Cushman to enter a decree reversing his original decision. The suit was a fight of the Seattle taxpayers to prevent forever invasion by the city of the general fund by taxation for payment of the interest and principal of the purchase price of the railway system. The Corporation Counsel will draft a form of decree to be signed by Judge E. E. Cushman, dismissing the company's suit, which sought to compel the city to complete the contract for purchase of the railway lines. The city's defense to the suit was that it already was living up to the contract.

Under Judge Cushman's decision, the city would have been obligated to resort to taxation if necessary to support the municipal railway and pay interest and bond redemption to the Stone & Webster interests. Judge Cushman, however, was reversed by the Circuit Court of Appeals, whose ruling was affirmed by the United States Supreme Court. The decision of the Circuit Court of Appeals was entered Dec. 4, 1922, and the ruling of the United States Supreme Court denying the power company's petition for a writ of certiorari was entered April 16, 1923.

News Notes

Men Accept Compromise Wage.—Employees of the Ithaca Traction Corporation have accepted a compromise wage of 46 cents an hour. They had demanded 50 cents, and when this scale was refused by the company the men walked out. The strike lasted less than a week. Conferences brought the demand down to 46 cents, which the men accepted.

Traffic Surveys for Wichita and Topeka.—John A. Beeler will conduct traffic surveys at Wichita and Topeka similar to the one made recently in Peoria, reported in the Electric Railway Journal for July 7, page 29. All of these properties are now included in the system of the Illinois Power & Light Company, the successor to the Illinois Traction Company.

Wages Advanced.—Trainmen on the New York & Long Island Traction Company have received an increase in wages effective July 1. The new scale in cents per hour is from 49 cents for the first year to 57 cents inclusive for the five-year men. The former scale was 41 cents to 53 cents for the men who had been in the company's service ten years or more. The New York & Long Island Traction Company operates about 40 miles of line over the central, western and southern sections of Nassau County in Long Island.

Men Accept Wage Award.—As the result of an award fixed by the arbitration board and accepted by the trainmen of the Youngstown & Ohio River Railroad, operating an interurban passenger line and freight service between East Liverpool and Salem, wages will be increased 6 cents an hour. The new scale is retroactive to May 1. The maximum hourly wage has, therefore, been increased from 50 to 56 cents. Overtime will be paid for at the rate of time and a half. The new agreement will terminate on May 1, 1924.

New Franchise in Preparation.—It is understood that the officers of the Columbus Railway, Power & Light Company, Columbus, Ohio, are preparing a new franchise for presentation to the present Council. Under the City Charter provisions, renewal of the franchise cannot come up prior to two years before its expiration except by a vote of five members of Council. As the present franchise does not expire until two years from next February, the company cannot have its proposed renewal considered by the present Council unless five members are willing. Any time after next February the company could have the proposed new franchise introduced for consideration without the approval of five members, but by that time the personnel of Council will have changed, as four members are to be elected in November.

Foreign News

Substitution of Trackless Trolley for Tramway

Quite a stir was caused at first in English tramway circles by an announcement that the Town Council of Keighley, in Yorkshire, England, had decided to abolish its entire tramway system and substitute trackless trolley cars. The importance of this move is, however, somewhat reduced when it is ascertained that the municipality in question possesses only 3 or 4 miles of tramway route.

The local officials are well acquainted with the running of railless trolley cars, as they were among the earliest tramway authorities in England to adopt the railless car. For a number of years trackless cars, with the old Austrian over-running trolley, have been in use to a limited extent as an auxiliary to the tramways, and a few petrol buses have also been employed on still other routes. It does not appear that any of the three systems has been a great financial success, though of course the total population to be worked upon is comparatively limited.

The Town Council is not dissatisfied with tramway traction. Indeed, the chairman of the Tramways Committee said at the meeting of the Council that tramcars were the most satisfactory vehicles all round, and that if the Council could get some relief for the maintenance of the roads he would advise that the tramways be continued. As such relief could not be obtained the town could not afford at the expense of the tramway department to renew the tracks and maintain the roadway. It appears that nearly £130,000 would be required for track renewals, and that capital charges on this and the cost of repairs would be about £6,150 per annum. The cost of removing the rails would be offset by the sale of them, while the work of repaving, etc., to put the roads in condition so that the Council would take them over and maintain them as main roads was estimated at about £12,000.

It will be observed accordingly that a fundamental feature is that the cost of highway maintenance on the present tramway routes is to be transferred from the tramway undertaking, with an ultimate fall back on the borough rate payers to the county rate payers. This should be quite an agreeable financial arrangement for the borough, though what the county will say about it remains to be heard. Doubtless the objection from this source will develop when the Town Council proceeds to apply for an order to authorize the substitution of the trackless cars for the tramways. On the other hand, the Town Council will probably be called on to contribute to the cost of maintaining the roads in question.

It is proposed to purchase six double-deck trolley vehicles, to convert five single-deck vehicles now in use, and to purchase three single-deck vehicles. The cost of these, along with £3,640 for conversion of the overhead equipment, is put at £27,850, or rather less than the cost of renewing 2⅓ miles of tramway track. According to estimates, the annual revenue from the combined new and old trackless trolley system will be about £25,660, while capital charges and working expenses will be about £22,690. The surplus of £2,970 would cover the capital charges on the superseded tramways.

The British Tramway Association

The annual congress of the Tramways & Light Railways Association was held at Swansea, Wales, on June 21 and 22. Papers were submitted on some of today's problems and on tramway rolling stock.

British Electric Traction Company Sees Better Times Ahead

At the annual meeting of the British Electric Traction Company, held in London on June 15, J. S. Austen, the chairman, said that during the past year the company had done a little better than in the previous year. The directors were able to recommend the payment of a dividend of 5 per cent, the first distribution at that rate for some years. During the year £60,000 of debenture stock was redeemed, and the discount on that, amounting to £11,000, was applied to reducing the value of the securities. In addition, about £70,000 profit had been realized from sales of securities. This sum was also applied to the reduction of stock.

In the tramway and omnibus undertakings the receipts in 1922 had been adversely affected by the general trade depression, unfavorable weather, reduced railway fares, the engineers' lock-out, competition, and some reduction in fares. Against all these factors the company had done its best to contend and had achieved a reduction in the expenses. Profits, however, were about 20 per cent below those of the previous year. On the whole Mr. Austen was quite satisfied with that result.

With regard to the electricity supply undertakings, the trade depression in the early months of the year had caused a diminished demand for electricity, but the demand had increased during the latter part of the year, so that in the result more units were sold than in 1921, but at a lower average price.

Taking the federated companies—those which the British Electric Traction managed—as a whole, there was at the moment no visible reason why the present year should not show an improvement over the past. With regard to the tramway and omnibus companies, during the first three months of the year the results, compared with those of the corresponding period of 1922, show a substantial increase, indicating better results ahead this year.

Some London Tramway Aspects

In the House of Commons on May 31 some discussion took place on the London County Council (money) bill—a bill of the sort being required every year to meet the financial requirements of the Council. Viscount Curzon inquired where the London tramway system was worked with due regard to economy. He said that the Council declared that if it was permitted to connect its lines here and there the organizations could be made to pay. But these connecting lines would mean the introduction of tramways on busy arteries already badly congested with traffic. The Council should give more attention to street widenings. G. Hume, replying for the Council, explained that the most important matter in the bill in regard to new borrowing powers was for housing purposes. The tramway items were for clearing up purposes, not a single tramway extension being contemplated. The London traffic problem would shortly again force itself on the attention of the House. Before the summer was over 1,000 more omnibuses would be on the streets, and by next spring the position would have become intolerable. The tramways had never come on the local rates until the difficult years after the war. In 1919 there was a deficiency of £100,000; in 1920 £590,000, and in 1921, £80,000. But this year there would be a surplus of £100,000. The Council was now asking authority to raise £150,000 to remotor the cars in order to speed them up for the convenience of the public. The bill was given a second reading.

[The omnibuses referred to are run by companies in competition with the County Council's tramways.]

An Ancient Electric Locomotive

The first electric locomotive operated on the first "tube" railway in the world made its last journey on April 25. This locomotive, No. 1, was designed and constructed by Mather & Platt, and it began to run daily service on the City & South London Railway in 1890. The last journey was from Stockwell depot to the science museum at South Kensington, where it takes its place with the "Rocket," "Puffing Billy," "Sans Pareil" and other samples of the earliest steam locomotives in Britain. The City & South London Railway is the only London "tube" line on which electric locomotives are still in use, and they will all disappear when the reconstructed line reopens some nine months hence. Multiple-unit trains will then be used.

Financial and Corporate

"L" Roads in Chicago to Consolidate

The four elevated railways in Chicago are to be consolidated into one corporation. The proposal to carry out a plan of this kind has been under consideration for some time, but on July 17 announcement of the details of the plan for the reorganization of the finances of the railroads was made by the protective committee representing the noteholders.

The proposed reorganization and readjustment of the financial structure of the elevated railroads and the consolidation of the lines into one corporation will reduce the funded debt and capitalization of the roads to an amount approximately the same as the valuation of the property fixed by the Illinois Public Utilities Commission in 1919.

Although the roads have been operated for several years as a unified system under the direction of Samuel Insull, they have maintained their individual corporate existence. The Illinois Commerce Commission has already approved the merger of the Metropolitan, Northwestern and South Side lines and the purchase of the Oak Park line by the Chicago Elevated Railways Collateral Trust when the court orders its sale. The Oak Park line has been in the hands of a receiver for several years.

The plan about to be put into effect calls for a drastic scaling down of capitalization. The present outstanding debt and securities of the four companies is about $121,895,000. In the new corporation it is proposed to reduce this total to $87,196,500. The property value of the companies as fixed by the state commission for rate-making purposes is $89,514,932.

The proposed reduction in capitalization of about $34,700,000 will be accomplished chiefly by the wiping out of the Chicago Elevated Railways preferred and common shares, which at par value amount to about $40,999,000. The new corporation will have $20,329,500 of common stock, but this will go to holders of other securities of the old companies. In the proposed reorganization the underlying mortgage bonds and equipment notes of the operating companies, which total $46,704,000, will remain undisturbed.

Purchase Ordinance Prepared for Introduction in Milwaukee

Sixty-five million dollars must be spent by the city of Milwaukee to acquire all the holdings of the Milwaukee Electric Railway & Light Company. By acquiring only the property in the metropolitan area Milwaukee must expend $50,728,000.

This information was revealed after two years of study by the special committee of the Common Council on acquisition of public utilities. This valuation is included in the final draft of the ordinance for municipal ownership of the company which the committee hopes to present to the Common Council at its next meeting.

The ordinance provides that the city acquire merely the holdings in the metropolitan area. In brief, this means all the property of the company in Milwaukee County, excluding the electric interurban lines which run to Kenosha, Racine and other points outside the metropolitan area. Thus, it will be seen that the company will retain ownership of $15,000,000 in property outside this zone should the Common Council approve the ordinance.

The ordinance provides that the city has the option to take over the company by direct purchase or on the piecemeal system.

Authority to Issue New Securities Sought by Illinois Power & Light Corporation

Improvements estimated to cost $1,880,000, to be made on the Illinois Traction System, will be paid for out of the proceeds of an issue of $2,059,600 of 7 per cent preferred stock. Authority to sell such an issue is being sought by the Illinois Power & Light Corporation from the Illinois Commerce Commission. The company also plans to issue $1,905,000 of first and refunding mortgage bonds with which to reimburse it for money already spent for new power houses, boiler plants and railway and other improvements. The principal items included in the program of improvements are $1,200,000 for a new power house at Venice, Ill., and $98,862 for a new turbine.

The Illinois Power & Light Corporation has entered into a contract with the Missouri Utilities Company, Mexico, Mo., whereby it will acquire control of the common stock of that company. The stock was purchased from E. R. Locke and Willy F. Corl, Mexico. The purchase price was not revealed.

Creditable Progress Made in Detroit

Research Bureau Reports that Revenue of Municipal Railway for Eleven and One-Half Months Is in Excess of All Charges Made for Operation and Maintenance, Except Depreciation, and Interest and Sinking Fund Requirements

REFERENCE was made in ELECTRIC RAILWAY JOURNAL, July 7, page 34, to a report on the finances of the Department of Street Railways of Detroit, presented by the Detroit Bureau of Governmental Research, Inc. This report has now been published in full in *Public Business*, issued frequently by the bureau "to circulate facts concerning city, county and state governments for citizens of Detroit."

As was indicated previously the bureau holds that the contract between the city and the Detroit United Railway, from which the present municipal properties were purchased, constitutes an unusually heavy financial burden. It is suggested that consideration be given to its refinancing. The conclusions of the bureau, based upon the facts set forth by the records of the Department of Street Railways and subject to final verification by independent audit, are as follows:

That under the circumstances, creditable progress has been made toward solving the financial problems of the Department of Street Railways.

That general city taxes have not borne any charge for interest and sinking fund payments.

That the revenues of the Department of Street Railways during the past eleven and one-half months are in excess of all charges made for operation and maintenance (except depreciation), and interest and sinking fund requirements.

That sufficient reserves are being set aside in a sinking fund to provide for the payments of interest and to retire all outstanding bonds issued on behalf of the Department of Street Railways.

That sufficient reserves are being set aside to meet the nineteen semi-annual payments of $500,000 each on the purchase contract with the Detroit United Railway and to make the final payment of $7,580,000, due in 1931.

That reserves based upon general and local experience are being set aside from earnings to meet claims from injuries and damages, taxes, and insurance.

That partial rehabilitation of the property acquired from the Detroit United Railway, to the extent described in this report, some of which might fairly be chargeable to capital, has been effected and paid for out of earnings. To finance from earnings the extensive program of rehabilitation necessary to needed service will require several years if uninterrupted by business depression. To complete such program promptly will necessitate either an issue of bonds or an increase in rate of fare.

That if earnings under existing conditions are applied toward rehabilitation, extensions to furnish satisfactory service must be provided by the issue of bonds or by an increase in rate of fare.

That the purchase contract for the acquisition of the Detroit United Railway lines, although expedient under the then existing debt limitations, constitutes an unduly heavy financial burden, and it is suggested that consideration be given to its refinancing.

That a depreciation reserve, as such, has not been established, but it is understood that the Board of Street Railway Commissioners agrees such reserve is highly desirable as a means of determining actual property values, operating costs, and proper rate of fare, and contemplates the establishment of a depreciation account in the near future.

It will be recalled that the purchase contract was approved by the vote of the people on April 17, 1922, and became effective on May 15, 1922. The amount of the contract was $19,850,000, with an initial down payment of $2,770,000 and semi-annual payments of $500,000, each for a ten-year period, the balance, $7,580,000, becoming due on Dec. 31, 1931. The initial payment of $2,770,000 was provided out of the bond issue of $4,000,000 authorized at the time the purchase agreement was approved. The balance of the bond issue, $1,330,000, is available as authorized for the payment of supplies received from the D. U. R., the purchase price of which is in process of arbitration.

The bureau explains that the date April 30, 1928, was taken for the compilation of the report because it was the latest date for which complete financial and operating statistics were available at the time of the study. This therefore accounts for the period of eleven months and a half covered by the report as presented. The bureau says, however, that the accuracy of the figures and of the conclusions drawn from them must depend upon the integrity with which the financial records have been maintained. It feels assured by test that revenues have been reported and that the expenditures as between current operation and capital outlay have been carefully distinguished in the documents of original entry and fully and correctly reported, but that the final accuracy of the financial statements must depend upon the report of the next audit, which probably will be made as of June 30, 1923. The statement of revenues and expenses for the eleven and one-half months as contained in the report is shown in the accompanying table.

Detroit Municipal Railway Earnings for the period May 15, 1922, through April 30, 1923.

Passenger revenue	$17,917,395
Parlor, sleeping and special car revenue	1.470
Miscellaneous transportation revenue	1
Station and car privileges	112,925
Rent of track and facilities	943,599
Miscellaneous income	25,625
Rent and other income from physical property	14,152
Income from unfunded securities (bank balances, notes, etc.)	47,373
Income from sinking fund and other reserves	5.092
Total revenues	$19,067,631

For the same period, expenses were as follows:

Maintenance of way and structures	$1,763,755
Maintenance of equipment	1,225,367
Power	1,884,726
Conducting transportation	7,085,257
Traffic expenses	1,367
General and miscellaneous expense	1,408,324
Total operating expenses	$13,368,796
Taxes	625,748
Miscellaneous rents	7,075
Interest on purchase bonds ($4,000,000)	147,994
Interest on construction bonds ($15,000,000)	695,516
Interest on purchase contract	951,980
Sinking fund on purchase bonds	99,665
Sinking fund on construction bonds	471,849
Sinking fund on purchase contract (19 payments at $500,000; final payment, $7,580,000)	1,666,556
Amortization expense on funded debt	1,816
Total expenses	$18,036,995

The figures of earnings are inclusive not only of transportation but of all other operations, which arise through furnishing the transportation service of the city.

The net excess of income over operating expenses, taxes, interest, and sinking fund requirements (but not including depreciation), for eleven and a half months ended April 30, 1923, was therefore, $1,030,635, before the net loss of $1,843 from bus service is deducted. The report says that were the Department of Street Railways owned and operated by a private company, its statement of net earnings before depreciation (not a statement of the excess of income over operating expenses, taxes, interest and sinking fund requirements, as shown above), for the eleven and one-half months, would be $5,066,009, as follows:

Operating revenues		$19,067,631
Operating expenses		13,368,796
Net revenues		$5,698,834
Taxes	$625,748	
Miscellaneous rents	7,075	
		632,824
Net operating earnings before depreciation		$5,066,009
Interest		1,795,487
Net earnings available for depreciation, sinking fund for indebtedness, extensions, etc.		$3,270,522

It is explained by the bureau that in the expenditures above stated for operating expenses there are included expenditures charged to maintenance which are properly chargeable to capital. On the matter of depreciation the bureau says:

> The Department of Street Railways, with the experience of substantially a year's operation, is now in a position to classify the entire properties and set up an adequate depreciation account. The bureau understands that this will be done. This charge, when ascertained, will be made against the net earnings before depreciation of $5,066,009 above shown.

On this same matter it says elsewhere in the report:

> At present no depreciation reserve, as such, is established, although expenditures properly chargeable to capital have been charged as maintenance, and indebtedness in excess of an estimated amount of depreciation for the period has been retired from earnings. The Department of Street Railways has provided and to date is maintaining:
>
> (a) A sinking fund out of earnings for the retirement of its bonded indebtedness at maturity.
>
> (b) A sinking fund out of earnings to pay the purchase price under the D. U. R. contract.
>
> In this respect, the D. S. R. differs from a privately owned street railway corporation in that it is mandatory upon the municipal utility to retire its indebtedness from earnings.

The total of the city's equity in the railway properties is placed at $3,633,758. The excess of assets over liabilities, or the surplus, as of April 30, 1923, was $1,311,687. The assets as of April 30 are given as $40,898,038. The total liabilities at the same date are given as $37,264,280, exclusive of the city's equity of $3,633,758. The bureau says that the present fare—5 cents with 1 cent additional for transfer—amounts to an average fare of nearly 5⅓ cents.

The direction of the Bureau of Governmental Research rests with a board of nine trustees and the personnel includes leaders in their several walks of life, among them merchants, bankers and professional men. The bureau is organized to increase the affectiveness of local government through co-operation with officials and by keeping citizens informed about the city's business. The bureau is absolutely non-partisan, and takes no part in the election or appointment of persons to office. The cost of the bureau is financed and controlled by the Detroit Community Fund, but only such contributions are used as are specifically designated to the bureau by the donors.

Ohio Interurban Being Dismantled

The power plant of the Springfield, Troy & Piqua Traction Company at Springfield, Ohio, is being dismantled. This marks the final step in the junking of the road by the Schoenthal Company, Columbus, which purchased the properties at receiver's sale. The tracks, etc., have already been scrapped, except for 2 miles of the right-of-way, which has not been touched. A car is being operated over the portion between Springfield and Maitland by the Springfield & Suburban Railway, owned by the Schoenthal Company. This line provides transportation for employees of the Victor Rubber Company, and also serves as a transfer between the Erie passenger station at Maitland and Springfield, as well as for the transfer of freight in Springfield. An attempt was made by persons residing along the line to form a company to take over the property, but the deal fell through. The Schoenthal Company did not begin the work of scrapping the line until it became apparent that the effort had failed which was being made by the residents to finance a new company to operate the line.

Saginaw Sale Aug. 18—Reorganization Terms Announced

The sale of the local property of the Saginaw-Bay City Railway will take place on Aug. 18. This is the date which has been fixed by the referee in bankruptcy, acting on the petition filed in the United States Court by Trustee Otto Schupp. Under the court order the sale will be free and clear of all mortgages. Mr. Schupp, as grantee under the franchise recently voted by the people, has formally accepted the contract, and will assign it to a new operating company as soon as it is organized. The property will, of course, be financed as agreed between the grantee and the City Council.

In this connection joint committees of bondholders of the Saginaw-Bay City Railway and the Saginaw Valley Traction Company have submitted a reorganization plan to the security holders along the lines laid down by the new franchise ordinance.

The plan calls for the incorporation of a new company, probably to be known as the Saginaw Transportation Company, which will issue 20,000 shares of non-par common stock, 14,790 shares of 5 per cent preferred, par $100, cumulative after Jan. 1, 1924, and approximately $1,000,000 of twenty-five year 5 per cent bonds under an open mortgage, maturing on Jan. 1, 1949. The bonds will constitute a first lien on all the property and will be redeemable at 102 and interest.

It is intended to exchange the old $584,000 Saginaw Valley Traction bonds for an equal face amount of new company bonds, with a bonus of one share of new common stock for each $500 face amount of the old bonds; the $1,479,000 Saginaw-Bay City first and refunding 5s are to be exchanged for an equal amount in par value of the new preferred stock and the right to subscribe, pro rata, to $400,000 additional bonds at not less than 85 and 18,832 shares of the new common stock at a price to be determined later. The proceeds from the sale of the $400,000 bonds are to be used in carrying out terms of the franchise in respect to betterments and payment of prior claims.

By this plan interest charges will be cut from about $117,000 annually to $50,000.

The franchise terms give the new company the right to charge a 10-cent cash fare instead of the present 6-cent fare. The provisions of the grant were reviewed at length in the ELECTRIC RAILWAY JOURNAL for July 14, page 70.

Wisconsin-Minnesota Property Bought by Byllesby

H. M. Byllesby & Company, Chicago, have purchased control of the Wisconsin-Minnesota Light & Power Company from the American Public Utilities Company.

The former officers of the Wisconsin-Minnesota Company have resigned and the following board of directors has been elected: H. M. Byllesby, president; R. F. Pack, vice-president; Halford Erickson, vice-president; A. S. Huey, J. J. O'Brien, R. J. Graf, F. W. Stehr, F. C. Shenehon, J. H. Briggs, H. W. Fuller and John H. Roemer.

The Wisconsin-Minnesota Company owns and controls 71,800 hp. of developed water power and 700 miles of transmission lines in western Wisconsin, supplying electricity to seventy-three cities and towns. The territory served by it is contiguous to part of that supplied by the Northern States Power Company. Both companies include in their holdings electric railway properties, the most important one being the line from Chippewa Falls to Eau Claire.

Auction Sales in New York.—At the public auction rooms in New York there were no sales of electric railway securities this week.

New Jersey Subsidiary to Issue Stock.—The State Board of Public Utility Commissioners of New Jersey has approved the issuance of $12,750,000 capital stock of the Public Service Electric Company, a subsidiary of the Public Service Corporation of New Jersey.

Dividend Declared.—The directors of the Madison Railways, Madison, Wis., at a meeting held on July 9 declared a semi-annual dividend at the rate of 7 per cent on the preferred stock of the company issued subsequent to March 1, 1922. The dividend is payable on Aug. 1 to stockholders of record on July 20. A bonus at the rate of 1 per cent per annum will also be paid under the same condition.

Certificates Offered. — Putnam & Company, Hartford, recently offered at 100 and accrued interest $487,500 of the 6 per cent equipment trust certificates of the Connecticut Company known as series F. The certificates are dated July 2, 1923, and are due serially in semi-annual installments Jan. 1, 1924, to July 1, 1928, inclusive. The certificates were issued in part payment for standard railway equipment consisting of fifty new double-truck cars, described in the ELECTRIC RAILWAY JOURNAL, issue of June 16.

Commission to Hear Valuation Appeal.—The Missouri Public Service Commission set July 19 as the date for hearing the motions filed by the United Railways and the city of St. Louis, Mo., for a rehearing in the valuation case of the United Railways. The company contends that the valuation of $51,700,000, placed by the commission on the company's property was too low. The city says it is too large. The decision of the commission fixing the valuation was reviewed at length in the ELECTRIC RAILWAY JOURNAL for June 9, page 980.

Purchase Negotiations Being Resumed.—Negotiations have been resumed for the purchase of the private right-of-way of the New York & North Shore line by the city of New York. Watson Robinson, attorney for the bondholders of the defunct company, said recently that he had made an offer to sell the private right-of-way and the tracks and wires of the entire line to the city for $50,000. Of the $50,000, should the offer be accepted, the bondholders would receive $40,000. The proposition is now being considered by A. J. Rinn, real estate appraiser of the controller's office.

Abandonment Authorized. — The Board of Public Utility Commissioners of New Jersey has granted permission to the Jersey Central Traction Company to abandon its lines in Middlesex County, New Jersey. Notwithstanding numerous experiments with regard to the rate of fare charged in order to increase riding the company has not been able to earn operating expenses, much less additional moneys required to pay interest on bonds. The plea of the company to the board to abandon service was reviewed at length in the ELECTRIC RAILWAY JOURNAL for July 7, page 33. Operation will be discontinued at midnight on July 28.

Utilities at Jamaica Under Stone & Webster—Stone & Webster, Inc., Boston, Mass., have been appointed general managers of a new company which has been organized by Montreal banking interests to carry on the electric light and power and electric railway business in Kingston, Jamaica, British West Indies. The financing has been done by a syndicate headed by Greenshields & Company, and including Aemilius Jarvis & Company, and Mackenzie & Kingman. The new company has acquired by purchase the West India Electric Company, Ltd., and the Jamaica Electric Light & Power Company, Ltd., which have been combined into the Jamaica Public Service Company, Ltd. It will do the entire electric light and power and tramway business in Kingston and the adjoining parishes of St. Andrew and St. Katherine.

Old Nassau Lines Taken Over by B.-M. T.—At midnight on July 13 the Brooklyn-Manhattan Transit Corporation took over the operation of the lines of the Nassau Electric Railroad, which has been in the hands of receivers since Dec. 31, 1921. This is in accordance with an order signed by Judge Julius M. Mayer in the Federal court for the Southern District, who appointed Lindley M. Garrison receiver for the Nassau lines. This is the first of the surface lines to be returned to the successor company to the Brooklyn Rapid Transit Company.

Line in Bad Condition.—Appraisal of the tangible properties of the Tacoma Municipal Railway line and an examination of the accounts of the system in City Comptroller John Roberts' office did not lend much comfort to any hope of the Emergency Fleet Corporation that the line will be worth fighting for to collect $232,000 loaned to the city during war times for enlarged service, according to city officials. The rolling stock is wearing out, the engineers found, and despite an admitted economical operation of the line, a monthly deficit was found. During May the deficit was $2,198, an increase over that of April. The appraisal and book examination were made as a part of the preliminaries of the negotiations which are expected to be made between the city and government for a settlement of the loan, which the city maintains should be entirely written off as a war expense.

Reduction in Valuation Sought in Tax Case.—J. F. Evans, tax attorney for the United Railways, St. Louis, on July 14 appeared before the Missouri State Tax Commission and requested that the road be permitted to reduce its tax return $8,300,000. He stated the road made a return listing its properties at approximately $60,000,000, and that the Missouri Public Service Commission later fixed the railway's valuation for rate-making purposes at $51,700,000. He asked that the tax return be cut that amount, and also that only 80 per cent, or $41,360,000, be subject to taxation. Mr. Evans said that the $70,000,000 valuation which the company sought to have placed on its property in the recent valuation case before the Missouri Public Service Commission included about $9,000,000 of "non-essentials" for tax-making purposes and also $1,500,000 of depreciation. He was granted a week in which to prepare a brief supporting his oral arguments before the tax board. A decision is expected to be made in September.

Traffic and Transportation

Separate Service for Commuters

Engineer for New York Commission Sees Need for City Service Independent of Present Subways

Daniel L. Turner, consulting engineer for the New York Transit Commission, after a preliminary survey of suburban traffic, has recommended the construction of a new rapid transit system in Manhattan, independent of present subways, designed for the sole purpose of handling commuting traffic. Mr. Turner came out strongly in favor of this rather than the alternative of building a union suburban terminal in the heart of the city. He said this would only make for greater congestion on existing lines.

Co-operation of all the railroads entering this city has been secured by the Transit Commission in searching for a permanent remedy for the commuting problem. Engineers of the State board and the companies have had a series of consultations on this subject and more are under way.

In the report by Mr. Turner the problem is discussed as follows:

> 1. Ten years hence it will be impossible to accommodate the 600,000,000 or more suburban passengers per year with the facilities that now exist.
>
> 2. It will be impossible to take care of this traffic on the transit lines designed for the use of city traffic. It will be as much as the city can do to obtain facilities enough to accommodate the city traffic originating within its own limits.
>
> 3. It will be impossible to interject the steam railroad suburban traffic that will have developed ten years hence into the city transit lines now terminating at points near the outer boundaries of the city.
>
> 4. In order to accommodate the suburban business originating on the steam railroad lines it will be necessary to do one of two things, either:
>
> (a) Provide additional terminals for the accommodation of this rapidly increasing suburban traffic which will relieve the existing terminals, or,
>
> (b) Shunt all of the suburban traffic past the existing terminals and provide a separate and independent collecting and distributing transit system traversing central Manhattan for the exclusive use of suburbanites now served by existing steam railroad lines.
>
> In other words, the solution of the problem means building new suburban terminals or distributing the traffic through central Manhattan just as the rapid transit lines now distribute the traffic originating along the outlying branches of such lines.

It is Mr. Turner's opinion that it would be a mistake to follow the first of these alternatives—that is, to build new terminals for the use of suburban traffic. As he sees it, this would only mean concentrating the suburban business at separate points and creating congestion worse than now exists. From these congested points the traffic would have to be delivered to its destination over the city transit facilities, thereby throttling these facilities and prohibiting them from properly serving the area within the limits of the city. It would be just as reasonable to dump all of the rapid transit traffic originating on the city transit lines at two or three points in central Manhattan and expect it to find its way to its destination over some other lines of transit as it would be to provide for the future handling of suburban traffic from terminals in such a manner. In conclusion Mr. Turner said:

> In my judgment the only way that this problem can be properly solved is to develop an independent transit system traversing central Manhattan for the exclusive use of the suburban passengers of the future; in other words, the only adequate solution of the problem will be the development of a metropolitan transit plan to be independent of, and to be superimposed over, the transit plan designed to serve the city exclusively. Just how this can best be done will depend on the conclusion of our studies.

United Traction Takes Action Against Jitneys

A loss of from $500 to $1,000 a day is claimed by the United Traction Company, Albany, N. Y., through illegal operation of jitneys. This claim was made in its contempt of court action brought July 14 against sixteen Troy jitney drivers charged by the company with violation of the Hinman injunction order of Sept. 10, 1921, which restrains jitney operators from competing with the trolley company.

The United Traction Company is preparing to serve papers on more than 100 additional jitney operators in Albany and Troy, according to Ernest Murphy, superintendent of the company.

J. Stanley Carter, attorney for the traction company, said that the alleged violations have been occurring since May and that the jitney men have been operating on several lines of the company. In spite of the Hinman injunction order, jitney service between Albany and Troy has not ceased altogether since the United Traction trolley strike of two years ago.

Mayor Praises Traction Management

Mayor W. A. Magee of Pittsburgh, Pa., predicted better railway service and lower fares in a talk to members of the Pittsburgh Advertising Club on June 26. Among other things he said:

> It is not unlikely that in the next few months the genius of the Philadelphia Company, A. W. Thompson, who is working hard to regenerate the insolvent Pittsburgh Railways, will have brought success out of failure and that with new equipment and new leaders the street car system will improve its service in every way and that with this improvement in service there will come a lowering of carfares.

The Mayor is a Republican, but the Pittsburgh *Post*, a Democratic paper, took the Mayor's speech as a text for its leading editorial in the issue of June 28. In concluding its comment that paper said:

> If Mayor Magee were to deliver such an address every week, keeping the attention of the public focused on these important subjects, he would find the effect most encouraging.

Commission Reserves Decision in Rate Case Involving Reductions

Hearings were concluded recently in the Nashville Railway & Light Company case under an order of the State Railroad & Public Utilities Commission to show cause why rates should not be reduced on light, power and car fare. Experts who made the investigation for the commission find that the company has lacked $169,000 of paying the stipulated return of 6½ per cent on its investment.

The testimony presented at the final hearing touched directly upon the assumed contracts existing between the Nashville Railway & Light Company and two supervising companies, by which the local concern must pay to one of these supervisors 2 per cent and to the other 6 per cent, or a total of $140,000 annually. The commission sought to ascertain whether the contracts were really valuable to the company or its consumers.

At the concluding session the company introduced Halford Erickson of Chicago, vice-president of the H. M. Byllesby Management Corporation. He said about 75 or 80 per cent of utility companies are under supervising companies, and they derive great benefit from these large corporations in the financing of their properties, and in the availability of expert service. He said this also makes it possible for small communities to get service that they could not otherwise afford.

Following the conclusion of the testimony, Attorney W. E. Norvell, representing the company, asked that the commission issue an order permitting the Nashville Railway & Light Company to use a part or all of its depreciation reserve in extensions and additions to its plant, and agreeing that it will be returned to the reserve fund with 4 per cent interest over a period of years to be determined upon.

The commission announced at the conclusion of the hearing that it would issue, through its chairman, Harvey H. Hannah, a formal order in the case at an early date. The case has been pending before the commission since last May.

Arrangements Under Way for Acquisition of Bus Line

Final negotiations are now under way for the transfer of the Woburn-Reading Bus Line, Inc., to the Eastern Massachusetts Street Railway. The railway will take over the bus business in Woburn, North Woburn, Wakefield, Reading, Stoneham and from Wakefield Square to Wakefield Park, from Wakefield Square to North Saugus and from Wakefield to Reading by way of Lakeside.

The Eastern Massachusetts will substitute its own buses for those operated by the Woburn-Reading line. The fare will be 5 cents from the center of any community to the town line and 10 cents from points on one side of the center of a town to a point on the opposite side. Street car fares in the same community will not be affected and will remain at 10 cents per zone, except that the fourteen-ride tickets for $1, good between Wakefield Square and the Greenwood district of Wakefield, will remain in force.

County Judge Vacates Jitney Restraining Order in Schenectady

An unusual situation has developed in the city of Schenectady in connection with its trolley strike. On July 16 County Judge McMullen, claiming concurrent jurisdiction with the Supreme Court on orders issued out of court, issued an order vacating the jitney restraining order of Supreme Court Justice Angell of Glens Falls. While there seems to be a well-established legal ground for concurrent jurisdiction, the action of a county judge in setting aside an injunction order of a justice of the Supreme Court is, so far as can be determined, absolutely without precedent in this state.

The logical course of action will be for the Schenectady Railway to appeal to the Appellate Division of the Supreme Court, from which source it may hope to obtain a permanent injunction restraining jitney operations. The action of Justice McMullen has created a furor in judicial circles.

In the meantime, pending an appeal to the higher court, attorneys for the Schenectady Railway are proceeding on the assumption that the order lifting the injunction is illegal and are getting ready to summon a number of jitney operators into court for contempt of the Angell order. The order of Justice McMullen restored jitney service in Schenectady.

Harry B. Weatherwax, president of the Schenectady Railway, issued a statement in which he said that the crusade against jitneys would be vigorously waged and the Angell injunction enforced.

Railway Plans to Do Trucking Business in Michigan

The Detroit United Railway has applied to the Michigan Public Utilities Commission for permission to do a general freight hauling business with motor trucks and trailers. The application stated the Detroit United Railways Trucking Company would be immediately organized with a capital of $500,000.

It is planned not only to do straight highway hauling where necessary for package and carload lots, but to combine this with the trolley freight service of the Detroit United Railway. There will be pick-up work as well as piece distribution.

In connection with the application, President E. G. Stevenson said:

> The Detroit United has an investment of $35,000,000 in the territory it serves. It proposes to add to that investment whatever amount is necessary fully to serve the territory and at the same time guard the investment already made.

Buses Operating Under City Supervision Restrained in New York

The whole matter of the operation of buses in New York City under direction of the local city administration has been opened up again. For some time now the buses installed under city supervision have continued to run because of a stay of execution obtained by the Corporation Counsel. This stay was nullified on July 14 when the Court of Appeals refused to entertain an appeal from the ruling of the Appellate Division of the Supreme Court, which a month ago upheld Judge Mullan's injunction in a case brought by a taxpayer to prevent the appropriation of further funds for bus supervision by the city.

There are twenty-seven bus lines in operation and last year they carried more than 100,000,000 passengers. The prediction was made that they would cease service at once, but up to Thursday the court had issued no formal order and there was some speculation as to whether he would issue a stay for another thirty days.

An easy way out of the matter was suggested by the Transit Commission, which stands ready to legalize bus permits for temporary or other service, but this proposal Mayor Hylan has rejected. Instead he called a special meeting of the Board of Estimate for the purpose of adopting a resolution to appeal to the Governor to call a special session of the Legislature. On Wednesday the Governor came to the city to inquire into the situation.

In a tirade against the so-called traction interests, which he sees behind the recent court moves, Mayor Hylan said:

> The faithless flouting by the traction corporations of their franchise agreements made the installation of emergency bus routes an absolute necessity. In no other way could the comfort, convenience and welfare of the traveling public, discommoded by the deprivation of needful transit facilities, have been promptly and effectively served.

The bus owners themselves have suggested that a $3,000,000 corporation be formed to own all the buses now being run under municipal supervision and that this company apply to the Board of Estimate for a franchise revocable on ninety days' notice and containing a clause which would permit the city actually to acquire title to the bus equipment.

Weekly Pass Enters Bradford, England, Successfully

The expression "Carrying coals to Newcastle" can now be matched by the phrase "Passing the pass to Bradford," inasmuch as British tramways have long been familiar with the unlimited-ride season ticket. The differences in adoption of the weekly pass, however, are the shortening of the validity period to a calendar week (Monday to Sunday inclusive), the introduction of transferability and the sounder system of pricing. Because of the variety of fares already in use on the system, R. H. Wilkinson, the manager, recommended that the trial installation of two months be made on but one route. This is known as the Lidget Green section. It is only 1.5 miles long, so that the ordinary fare of 1.5d. (3 cents) serves the entire run. Up to 9 a.m., however, there is also available a workmen's fare of 1d. (2 cents). The pass has been priced at 2 shillings (48 cents at full exchange), equivalent to sixteen ordinary fares.

It is hoped that the pass will have the effect of giving a lower fare to those regular patrons who add non-rush rides to their rush-hour rides without causing the reduction in revenue that would have followed a cut to 1d. (2 cents) for all classes of riders.

The restriction to one route makes the pass less attractive, but this may be offset by the Britisher's zone-fare training in taking short rides and in going home for lunch.

The first two weeks are reported as satisfactory. After allowing for the diversion of traffic from a neighboring route, it was found that passengers compared with the corresponding weeks of May increased 4.3 per cent and 3.4 per cent respectively and revenue increased 2.5 per cent and 2.3 per cent respectively. In the first week (June 18) 102,084 passengers were carried, of whom 21,122 used passes; in the following week the total was 103,089, of whom 22,125 used passes. The average number of rides per pass per diem was 3.3 in both weeks.

Wants One-Man Operation Stopped

Mayor Frank X. Schwab has served notice upon Herbert G. Tulley, president of the International Railway, to cease operating one-man cars on the local lines of the company in Buffalo. He said that unless this is done at once he will bring proceedings to compel the company to do so. Mayor Schwab told the International that one-man cars are a menace to public safety. One-man cars are being operated by the company on short lines and in sections of the city where the passenger travel is exceptionally light. Since the introduction of one-man cars on these lines the frequency of the service has been almost doubled. Commenting on the demand made by Mayor Frank X. Schwab, the *Express* says: "One-man cars do not inconvenience the public, though they may be an eyesore to the union and men out of jobs."

Bus Line in Medford.—The Boston Elevated has begun operation of a motor bus line in Medford, Mass., which supplies crosstown service for the people of old Medford and Medford Hillside.

Buses Supplement Railway Service.—Bus service was started by the Eastern Wisconsin Electric Company on July 3 in Fond du Lac, Oshkosh, Van Dyne, North Fond du Lac and Neenah. This service is designed to supplement the interurban rail service of the company.

Personal Items

Iowa Association Honors Mr. Chambers

President of Des Moines City Railway Made Head of Iowa Electric Railway Association

F. C. Chambers, president and general manager of the Des Moines City Railway, has been elected president of the Iowa Electric Railway Association. Mr. Chambers joined the company as electrical and mechanical engineer in 1913. In April, 1918, he took charge of power generation and distribution for both the city and the interurban lines. Later he was placed in charge of rolling stock. In April, 1920, however, the mantle of management fell upon him with his assumption of the post of vice-president and general manager. Still later he was operating receiver for the company.

F. C. Chambers

The periods of negotiating the franchise agreement, approved by the electors in November, 1915, and of carrying out the rehabilitation of the physical property had been passed through when Mr. Chambers assumed the rôle of manager, but the trials and tribulations incident to them were as nothing compared with the events that were to come later. Like many other cities, Des Moines had been drifting away from its railway. It had been trying to get something for nothing. The bus bug, or more properly the jitney bug, had bit it. As Elbert Hubbard once said: "You cannot fool calves by giving them whitewash instead of milk." Des Moines tried to force whitewash on its street railway calf and the calf nearly died before Des Moines discovered that something for nothing leaves nothing.

Thus it came about that the company withdrew service in July, 1921. It was not a vindictive move—the decision to stop service in Des Moines. Not all the angles to it can be reviewed here. There is no need for that. They have been told before in these pages. The withdrawal of service was purely a business matter. Des Moines starved its railway. And the railway had to shut down. On Mr. Chambers, however, fell the onus of this move. He didn't just explain. He went on and proved that the population of any city of any considerable size can be carried expeditiously and comfortably only by a responsible operating agent organized for service at the same time it is striving for profit.

It is a striking commentary on the changed state of public opinion there that the very company which such a short time ago was forced to the drastic action of shutting down service has been able to go before its own people and sell locally an issue of preferred stock to investors.

To Mr. Chambers, an engineer by profession, the events incident to the suspension of service were problems to be solved even though they did in this case mean working largely with men instead of materials. In the rehabilitation of the physical property of the company following the granting of the 1915 franchise, his efforts played an important part. It was the reputation that he made here and in his later work that led to his advancement to the post of operating head in 1922. Mr. Chambers has ever been alert to keep abreast of the latest engineering practices. He was one of the very first, for instance, to see the possibilities of the automatic substation. It was largely the early record of performance of the Des Moines installation that helped the quick spread of the automatic substation idea.

Mr. Chambers entered the traction field in 1896, in power house work for the Adrian Light, Heat & Power Company, Adrian, Mich. In 1901 he went to Rome, N. Y., as chief engineer for the Rome Gas & Electric Company. He left Rome in 1905 to become electrical engineer for the East St. Louis & Suburban Railway. From 1908 to 1911 his position was superintendent of power for the Springfield (Ill.) Consolidated Railway. In 1911 Mr. Chambers went to Chicago, where he became superintendent for the County Traction Company, now known as the Chicago & West Towns Railway. He remained with the company until 1913, when he went to Des Moines.

L. C. Bewsey, whose appointment to Cuba was announced in the ELECTRIC RAILWAY JOURNAL for June 30, has been made manager of the Cia Cubana de Electricidad at Santa Clara, Cuba. He will report to E. C. Deal, general manager of the Cuban properties. As for the Electric Bond & Share Company, to which reference was made previously in the ELECTRIC RAILWAY JOURNAL, in connection with this matter, it is not represented in Cuba at all. Mr. Bewsey was formerly superintendent of the Michigan United Railways at Kalamazoo.

C. Melvin Sharpe in Washington

Executive Assistant to President Ham Is a New Figure in Electric Railway Circles

C. Melvin Sharpe, who has recently been appointed as executive assistant to William F. Ham, president of the Washington Railway & Electric Company and the Potomac Electric Power Company, Washington, D. C., has been a resident of the nation's capital for the past twenty years.

Mr. Sharpe was born in Philadelphia in 1881, a son of George Heppard Sharpe of that city. He was educated by private tutors and later at the Philadelphia School of Industrial Art and graduated as a Fellow in Art of the Pennsylvania Academy of the Fine Arts with post-graduate work abroad.

C. M. Sharpe

His organizing and directive abilities were recognized during the late war and the designing, engraving and manufacture of the issues of the liberty bonds and other paper securities of the government engaged his earnest and constant attention until Secretary McAdoo made him secretary of the Liberty Loan Committee of the District of Columbia. His management of various campaigns of civic and national proportions has earned for him a reputation for acutely sensing the pulse of the public and has brought him in close contact and association with men and women prominent in civic, national and international relations.

The present civil service retirement act, whereby civil employees of the government are retired after a certain term of service, was in large part due to the efforts of Mr. Sharpe, while his direction of the Interchurch World Movement Campaign in the district was a conspicuous success. His latter work with the Chamber of Commerce of the United States and the recent brilliant work with LaSalle Extension University would seem to augur his success in his new association with the Washington Railway & Electric Company in its public relations work in Washington and the surrounding country. While he is a newcomer in electric railway work, Mr. Sharpe is a student of economics, banking and transportation matters. In his new position he will apply himself to perfecting plans looking to improvement in service.

Four New Vice-Presidents for U.G.I.

Four new vice-presidents have been elected by the board of directors of the United Gas Improvement Company, Philadelphia, Pa. This action increases the number of vice-presidents from five to seven.

Randal Morgan, who has been associated with the company for forty years, retires as vice-president and becomes chairman of the executive and finance committee.

Walter Clark, who has served the company for thirty-five years, retires as vice-president and becomes consulting engineer.

Lewis Lillie, vice-president, will in addition assume the duties of general manager.

The new vice-presidents are:

James T. Hutchings, who retires as general manager and becomes vice-president in charge of operation and of plants.

G. W. Curran, who retains the title of secretary, vice-president in charge of accounting.

J. A. Pearson, promoted from purchasing agent, who will be in charge of purchases.

F. J. Rutledge, promoted from manager of the new-business department, who will be in charge of sales of gas, electricity and appliances for using the same.

The other vice-presidents are Paul Thompson and Philip H. Gadsden. William W. Bodine becomes assistant secretary and assistant treasurer. In addition to his duties as assistant to Vice-President Lillie Mr. Bodine was also appointed secretary of the executive and finance committee. The positions of general superintendent and assistant general superintendent were abolished. Rollin Norris was appointed gas engineer, Paul Spencer electrical engineer and John B. Klumpp inspecting and valuation engineer.

Mr. Nichols in Jamaica

Alfred S. Nichols has been appointed manager of the new company which has taken over the electric light and power and the electric railway business in Kingston, Jamaica. Mr. Nichols is of English birth. He has had a wide business experience in British mercantile work and during the past twenty years in the United States in newspaper work and in the operation of public utilities. He has been with the Stone & Webster organization for thirteen years and for the past six years has been manager of the light, power, gas and street railway at Paducah, Ky., a company under Stone & Webster management. The properties at Jamaica have recently come under the direction of Stone & Webster as managers.

J. M. Penick Installed Railless Trolley in Petersburg

J. M. Penick, connected with the Virginia Railway & Power Company, Richmond, Va., since 1910, supervised the installation of the new trackless trolley service put into operation recently by that company in Petersburg. There has hardly been sufficient time under operation by this system to form a basis for accurate judgment as to its real future possibilities, but the results so far achieved with the new service promise a wider use of railless transportation in the future in Petersburg and in the other cities served by the company.

J. M. Penick

The installation of the new line was carried out under Mr. Penick in his capacity as general superintendent of railways of the Richmond and Petersburg divisions as well as the Richmond-Petersburg interurban division. He has served in these capacities since January, 1923. As indicated previously, Mr. Penick joined the company in October, 1910. His first work was assistant engineer in charge of the construction of reinforced concrete carhouses, this being the first big construction work under the company's program for rehabilitating the property after its reorganization in July, 1909.

In February, 1911, Mr. Penick was promoted to assistant chief engineer of railways, having charge of the construction and reconstruction of track, and in January, 1917, he was made engineer of maintenance of way and structures in charge of maintenance and construction of tracks, bridges and buildings. In March, 1922, as chief engineer of railways of the company, he was also placed in charge of equipment.

Obituary

G. R. Scrugham

George R. Scrugham died at his home in Cincinnati, Ohio, on July 12. Mr. Scrugham promoted the organization of the three interurban electric railways from Cincinnati to Batavia, New Richmond and Mason in 1896, and for a time was connected with the management of the Cincinnati & Eastern Electric Railway as president and general manager. Later he came into the public eye by organizing the policyholders of large life insurance companies in New York to effect reorganization of the companies. Before entering the electric railway field as an operator Mr. Scrugham had long been identified with street railway interests, principally as an officer of the Creaghead Engineering Company, Cincinnati, contractor for the construction of both city and interurban railways.

Since 1916 Mr. Scrugham had been connected with Pennsylvania coal companies, which he was reorganizing following their bankruptcy. When the campaign of Charles Evan Hughes for the Presidency was organized in 1916, Mr. Scrugham was made one of the managers, with offices in Washington. Mr. Scrugham was fifty-eight years old. He was born at Danville, Ky., but had lived in Cincinnati with his family for more than twenty-five years.

F. E. Connors

F. E. Connors, vice-president and general manager of the Spokane & Eastern Railway & Power Company and the Inland Empire Railroad of Spokane since February, 1920, died recently. He had steadily climbed the ladder of success since he first became identified with the Chicago & Alton Railroad, when he was only sixteen years old. After serving in the Chicago office for five years he went to the Santa Fé Railroad at Topeka. As was noted in the ELECTRIC RAILWAY JOURNAL of Oct. 14, 1922, Mr. Connors rose from a clerk in the stationery department when he started at Topeka to an assistant to the vice-president when he left in 1919. Following his resignation from the Santa Fé company he was appointed receiver of the Spokane & Eastern Railway & Power Company and the Inland Empire Railroad. A year later he was made vice-president and general manager, which position he held until his death.

When changes were made in the staff of the companies last fall Mr. Connors, along with Messrs. Gannaway and Paine, was chosen to continue as a captain. These three men were largely responsible for the operation of the traction lines during and after the receivership.

Since the death of Mr. Connors the offices of operating vice-president and traffic vice-president have been combined and the duties of both are being performed by Waldo G. Paine with the title of vice-president and headquarters at Spokane.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Mixing Manufacturing with Maintenance

By Henry S. Day

Westinghouse Electric & Manufacturing Company

From the time when electric railroads made their first appearance it has been generally regarded by operating officials as good practice to include in the shops a department for manufacturing renewal parts. Whether this belief ever had any justification is open to doubt, but today a close scrutiny of manufacturing methods and maintenance methods should convince any unbiased person that the two will not mix.

Just why a railway shop should be regarded as a manufacturing plant, capable of making anything from a filing cabinet to a wrist pin for an air compressor, is not very clear. The reason for the existence of a railway shop is not a manufacturing one. It is for maintenance and nothing else. True enough, in order properly to maintain equipment, it is necessary to have machinists and lathes, wood shop and carpenters. Beyond that, however, the parallel ends abruptly. Men and machines do not constitute a manufacturing plant without the other elements that go with them.

Manufacturers of electric railway apparatus have difficult problems to meet in making products destined for use under severe service conditions. The maintenance and upkeep of these same products develop many difficult problems, but of such a widely different nature that the manufacturer and the operator do not think in the same terms.

Today manufacturing consists of specializing, quantity buying and quantity production. Engineering, research, development, etc., all have a necessary and important place before production is started. The railway repair shop is seldom prepared to carry on such work. It is not equipped for manufacturing purposes, but is equipped only with tools and facilities for repairing. Where the manufacturer may have ten high-priced special machine tools built for speed and accuracy the average repair shop has one general utility tool, purchased with the idea of covering as wide a range of jobs as possible. Moreover, there is little doubt that the skill of workmen in manufacturing plants averages higher than it does in railway shops.

Manufacturing in a repair shop must of necessity be in small quantities, because few roads have sufficient equipment of one type to permit quantity production. The basic economies that can be effected in the future in electric railway operations will not result from the operators becoming manufacturers. They will come from closer inspection, systematic overhaul and reclamation. Carhouses and shops have today about the same appearance as they had years ago, and methods of overhauling and inspecting equipment are a good deal the same. The movement of cars, trucks and motors, however, should be worked out to obtain smooth progression. Manual labor and slow devices should be replaced by quick-moving machinery, and the repair shop should be placed on a basis similar to that of a manufacturing plant.

To summarize, the idea is that the savings sought by the operator are not to be found in manufacturing his own replacement parts, but in bringing his methods and facilities for repairing to a highly specialized and efficient point, reducing waste and developing reclamation.

Synthetic Lumber Has Possibilities

Considerable work is being done at the present time by lumber interests with a view to utilizing more fully the product of the forests. Satisfactory methods have already been developed for the manufacture of composition lumber through the utilization of sawdust in combination with a glue binder. Although this work is as yet very much in the experimental stage, it seems possible, according to the Forest Products Laboratory, that developments within the next few years will make possible the marketing of composition lumber suitable for many purposes where ordinary lumber is now used.

G. E. Officials Given College Honors

Four General Electric Company officials have recently been given honorary degrees at four important American universities.

Gerard Swope, president of the company, was awarded the honorary degree of doctor of science at Rutgers College on June 12. Owen D. Young, chairman of the board of directors, was given the degree of doctor of literature at St. Lawrence University, of which he is an alumnus, on June 12, while Dr. Irving Langmuir, assistant director of the research laboratory, received the honorary degree of doctor of science from Union College, Schenectady. David B. Rushmore, consulting engineer, was given the D.S. degree from his alma mater, Swarthmore College.

Round Trolley Wire Still in Demand

An impression prevails in some quarters that round trolley wire is decreasing in popularity, while the demand for grooved wire is increasing. According to the Bridgeport Brass Company there is no basis for such an idea. Its figures show that the proportion of grooved wire made in 1922 was no larger than the proportion made in 1916, 1917 or 1918. The total production of grooved wire is very much greater now than it was a few years ago. Inasmuch as this company is today making a great deal more trolley wire than formerly, the proportion between the grooved wire and the round wire therefore remains approximately the same.

Charles W. McKay Directs Valuation Work

Charles W. McKay, well known appraisal and valuation engineer, has been appointed manager of the division of valuation and appraisement of the Roberts-Pettijohn-Wood Corporation, consulting engineers, Chicago.

Mr. McKay was formerly president and general manager of McKay & Sherman, valuation engineers, and when Mr. Sherman retired from the firm, the name was changed to Charles W. McKay & Associates. Recently the interests of the latter have been merged with those of the Roberts-Pettijohn-Wood Corporation and Mr. McKay received his present appointment.

Since his graduation from Sibley College of Mechanical Engineering, Cornell University, in 1906 he has been engaged in engineering and appraisal work with what is now the New York Telephone Company, the McCall & Clark Company, efficiency experts of New York City; McMeen & Miller of Chicago, where he spent the major portion of his time on problems involving the appraisement of public utility properties; Central Union Telephone Company, the Cooley & Marvin Company and with L. V. Estes, Inc., of Chicago.

Mr. McKay is valuation consultant for the Industrial Extension Institute and has contributed numerous articles to the technical press.

Metal, Coal and Material Prices

Metals—New York	July 17
Copper, electrolytic, cents per lb	14.687
Copper wire base, cents per lb	17.50
Lead, cents per lb	6.05
Zinc, cents per lb	6.47
Tin, Straits, cents per lb	37.875
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$5.375
Somerset mine run, Boston, net tons	2.625
Pittsburgh mine run, Pittsburgh, net tons	1.95
Franklin, Ill., screenings, Chicago, net tons	1.675
Central, Ill., screenings, Chicago, net tons	1.55
Kansas screenings, Kansas City, net tons	2.625
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	$7.05
Weatherproof wire base, N. Y., cents per lb.	18.75
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N. Y., per gal	$1.05
White lead, in oil (100-lb. keg), N. Y., cents per lb	11.85
Turpentine, (bbl. lots), N.Y., per gal	$0.93

Rolling Stock

Jackson Railway & Light Company, Jackson, Tenn., has recently purchased three double-end Birney cars, Westinghouse equipment, from the American Car Company of St. Louis.

Dayton & Troy Electric Railway Dayton, Ohio, recently placed an order with the American Car & Foundry Company for ten box cars. The capacity of the cars will be 80,000 lb. Delivery is expected in September.

Louisville Railway has arranged to place orders with the Kuhlman Car Company, Cleveland, for forty pieces of additional equipment, which will include fifteen motorized cars and twenty-five trailers, total cost being around $350,000. Frank Miller, vice-president, stated that the motor cars would be equipped with 35-hp. General Electric 247-I motors and Westinghouse air brakes. Purchase of the additional equipment was recently approved by the board of directors, and company representatives have been conferring with the municipal utility authorities as to type. The cars will be of what is known as the "Peter Witt" type cars. The motor cars will have a two-door entrance at the front and another in the center. During dull hours they can be used as one-man cars. During rush hours they can be manned by two operatives. An order was recently placed by the company for ten motor cars and thirty trailers. This equipment was referred to in the ELECTRIC RAILWAY JOURNAL, issue of June 16.

Track and Roadway

Atlantic Shore Railway, Sanford, Me., will extend its line 2¼ miles.

Durham Public Service Company, Durham, N. C., expects to reconstruct 2,000 ft. of track with 80-lb. T-rail and steel ties.

Capital Traction Company, Washington, D. C., plans to spend during the present summer and coming fall about $546,500. The biggest job will be the replacement of the track on Seventh Street, N. W., from Pennsylvania Avenue to the Seventh Street carhouse. This work will cost about $274,000.

Dallas Railway is now laying heavy channel steel on Beverly Drive as part of its improvement program in Highland Park. Mayor H. R. Davis said the improvements by the traction company are being made in return for the privilege of collecting an 8-cent fare recently granted by the city.

Southern Public Utilities Company, Charlotte, N. C., will begin work on Aug. 1 on the extension of the line from its present termination on Glade Street to the new high school building.

Los Angeles Railway has started construction of double track on West Seventh Street between Hoover and Vermont Avenues. Seven-inch, 116-lb. Trilby rail is being used. This involves construction of half a mile of double track and will provide a new route for Western Avenue cars. Track now used on Hoover, Wilshire and Commonwealth Boulevards will be removed.

Union Traction Company, Coffeyville, Kan., through its stockholders has ratified the proposal to extend the interurban line 22 miles farther south into Oklahoma, reaching the towns of Talala and Oolagah. The extension of the Coffeyville-Nowata line to Oolagah, Okla., would place it within 45 miles of Tulsa. When the line is built into Oolagah, it is expected that an extension will then be undertaken to Collinsville, the largest town between Tulsa and Nowata.

Power Houses, Shops and Buildings

Northern Texas Traction Company, Fort Worth, Tex., is building a $34,000 reinforced-concrete paint shop at Pacific Avenue and Pine Street.

Northern Indiana Power Company, Kokomo, Ind., has purchased two 750-hp. boilers with stokers and auxiliary equipment.

Union Traction Company, Anderson, Ind., expects to build a large terminal station in Anderson, and has filed deeds with the Madison County recorder for all the real estate in the first half block south of Fifth Street, between Main Street and Meridian Street. The property cost $35,000. It is said that work on the new building will be started next year.

Pacific Electric Railway, Los Angeles, Calif., in connection with its Alhambra-San Gabriel line extension, will install a new power substation to take care of the increased power demands, also to improve the power conditions on the Alhambra-San Gabriel and Pasadena, Sierra Madre and Glendora lines. The new terminus on the line extension will be located at Golden West and San Gabriel Avenue, where a joint freight and passenger station will be constructed.

Trade Notes

Boiler Equipment Service Company, Atlanta, is now selling diamond soot blowers in the states of Georgia and Florida, having been appointed district representative by the Diamond Power Specialty Corporation of Detroit.

A. S. Moody, assistant northwest manager of the General Electric Company, has been appointed local manager of the Los Angeles office of the same company, to succeed R. L. Cash, who has been transferred to Schenectady. Mr. Moody is well known in the electrical industry on the Pacific Coast, having been identified with the General Electric Company in that section for the past sixteen years.

Union Switch & Signal Company, Swissvale Pa., has the contract from the Long Island Railroad for installing a complete system of automatic signaling on the four-track electric line between Hillside and Floral Park. This includes two electro-pneumatic interlockings, one at Queens, comprising ten switches and fourteen signals, and one at Floral Park, comprising nineteen switches and nineteen signals, as well as the remodeling of an existing mechanical interlocking at Hollis and the installation of twenty-seven automatic block signals between the interlockings. The automatic signals will be Style "B" 110 volts, 25 cycle, located on signal bridges spanning the four tracks. As an emergency power supply feature, a frequency changer will be installed at each interlocking to convert the 110 volts, 60-cycle city supply to 110 volts, 25-cycle.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., received a contract from the Cleveland Railway for $400,000 of substation equipment. The apparatus in the order includes eight 1,500-kw., 514-r.p.m., six-phase, 60-cycle, 600-volt, d.c. converters, twenty-four 550-kva., single-phase, 60-cycle, 11,000-volt transformers and automatic switching equipment for the control of four two-unit, 3,000-kw. substations. Each substation consists of two 1,500-kw. converters and all are to be equipped with supervisory control apparatus so that they can be remotely controlled from the dispatcher's office. Each substation will be equipped with nine feeders of the short-circuit detector type. In addition to this apparatus the order also included seven 550 kva. transformers, six of which are to be used in place of air-blast transformers included in a previous order for four 3,000-kw., two-unit substations and the other to be used as a spare. The plan of the Cleveland Railway calls for the erection of nine automatic substations in various parts of the city and the dismantling of the company's generating plant. The project was referred to in the ELECTRIC RAILWAY JOURNAL, issue of May 19.

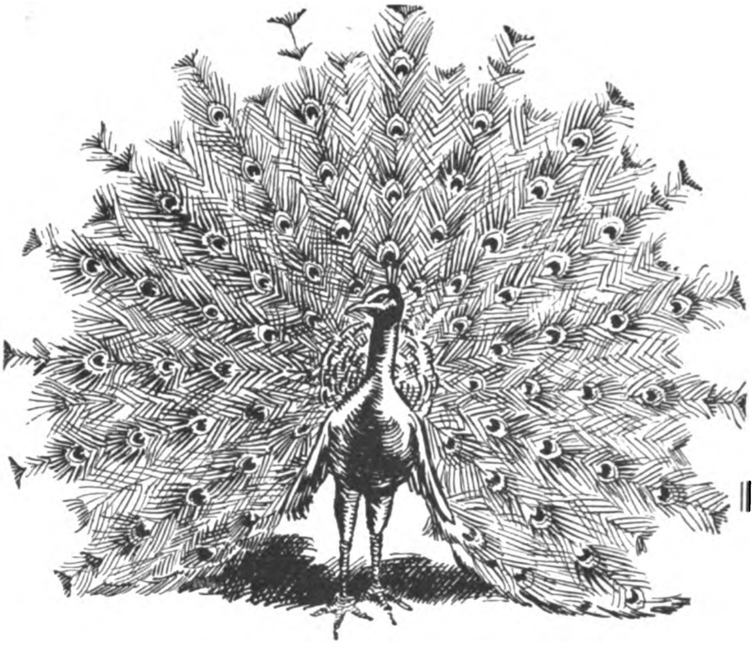
New Advertising Literature

Chausse Oil Burner Company, Detroit, Mich., has issued a new circular describing its railway torches.

Blacker Engineering Company, Grand Central Terminal, New York, has just issued a leaflet describing its Blacker "B" blacksmithing hammer for hand forging.

Okonite Company, Passaic, N. J., has published a booklet entitled "Splices and Tapes." The last page of this eight-page pamphlet gives instructions for making a perfect splice or joint.

Dossert & Company, New York, announce they have ready for distribution new price sheets covering all types and sizes of Dossert connectors. These sheets are Electrical Supply Jobbers' Association standard size.



Peacock was Right!

Long ago we proclaimed the safety car to be something new in the way of a braking problem. But for many years designers failed to make sufficient allowance for the exceptionally high ratio of live passenger load to car weight.

High Braking Power is Needed for Safety Cars

"The Peacock Staffless"

It may be seldom used, but the hand-brake should be equal to the air brake in braking power, so that it will be adequate if the emergency arises. And air brake design has advanced a long way since the advent of the Birney car.

THE PEACOCK STAFFLESS BRAKE
has the braking power

It is, and always has been, a high-power hand brake designed especially to fill the bill as an emergency brake on the safety car. It is always ready, quick in action, light in weight and occupies minimum platform space — less than any other hand brake made. It is familiar equipment to the experienced motorman, and quickly understood by the beginner.

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890 Ellicott Square, Buffalo, N. Y.

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Incorporated
Business Established 1894
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Reorganization Management Operation Construction
43 Cedar Street, New York City

THE J. G. WHITE ENGINEERING CORPORATION
Engineers—Constructors
Industrial Plants, Buildings, Steam Power Plants, Water Powers, Gas Plants, Steam and Electric Railroads, Transmission Systems
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Routing Surveys—Valuations—Operation Management
52 Vanderbilt Ave., NEW YORK

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Appraisals, Reports, Rates, Service Investigation, Studies on Financial and Physical Rehabilitation
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Consultant on Fares, Buses, Motor Trucks
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IRVINGTON VARNISHED Cambric

Seven factors of Quality

High Dielectric Strength Non-Hygroscopic
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The Copper and Steel entering into the manufacture of motors, transformers, turbo generators, etc., never wear out. Oil is renewed, but the only factor that can deteriorate is the insulation, and that in many cases has been good for the life of the equipment where Irvington Varnished Cambric was used. It has stood and will stand the test of time. That is why the large manufacturers insist on Irvington. Ask for samples and prices.

IRVINGTON VARNISH & INSULATOR Co.
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TRANSPORTATION
Complete Transit Surveys and Development Programs, adapting Motor-Transport, R.R. Terminal and City Plans. Traffic, Service, Routing, Operation and Valuation. EXPERIENCE IN 20 CITIES

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Consulting Transportation Engineer
Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation
PIQUA, OHIO

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Valuations of Electric Railways and Utilities of All Kinds
Traffic and Operating Studies
Allison Bldg. Richmond, Va.
Established Feb. 1913.

THE P. EDWARD WISH SERVICE
50 Church St. Street Railway Inspection 131 State St.
NEW YORK DETECTIVES BOSTON

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

Reliable Signal Service
FAHNESTOCK
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TO
STOP CAR
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The unshakable grip of Fahnestock Connectors gives perfect electrical contact which will not jar loose or work out. Quick - disconnecting features, without the use of tools, permits rapid removal when necessary.

Avoid annoyances which arise from defective and faulty push button construction. Equip your cars with Fahnestocks.

Write for Full Particulars

Fahnestock Electric Co.
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COLLIER SERVICE sustains car card space value by maintaining a nation-wide organization of car advertising experts.

CANDLER BUILDING THE HOME OF COLLIER SERVICE.

Barron G. Collier
INCORPORATED
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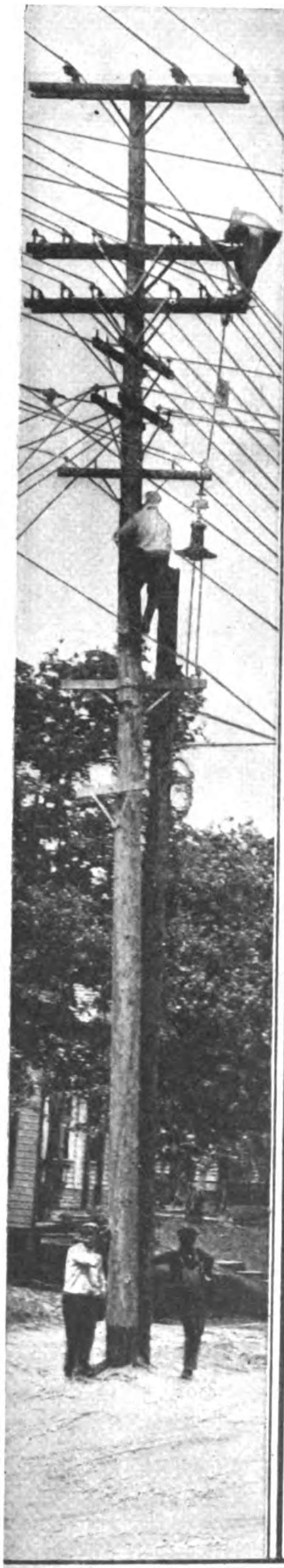

Confidence!

Confidence in the "P & H" Guaranteed Penetration Process" has been thoroughly established by the manner in which it has withstood every test. The lead shown here is typical of the many lines throughout the nation built of "P & H" Guaranteed Penetration Process Poles

The "P & H" Guaranteed Penetration Process

guarantees to the buyer, **in writing,** a full **one-half inch** uniform penetration of the preservative throughout the ground line area. The Butt-Treating price is refunded on any pole that does not show this definite specified result.

Don't be satisfied with guesswork—insist on the genuine "P & H" if you want the lowest maintenance costs, the most reliable pole service, the longest pole life.

We can fill any pole needs—for Butt-Treated and untreated Northern White and Western Red Cedar Poles—or for any form of Butt-Treatment.

Prompt shipment assured by the convenient location of our yards in the North Central and Western States.

Get the facts about Butt-Treatments—write for folder.

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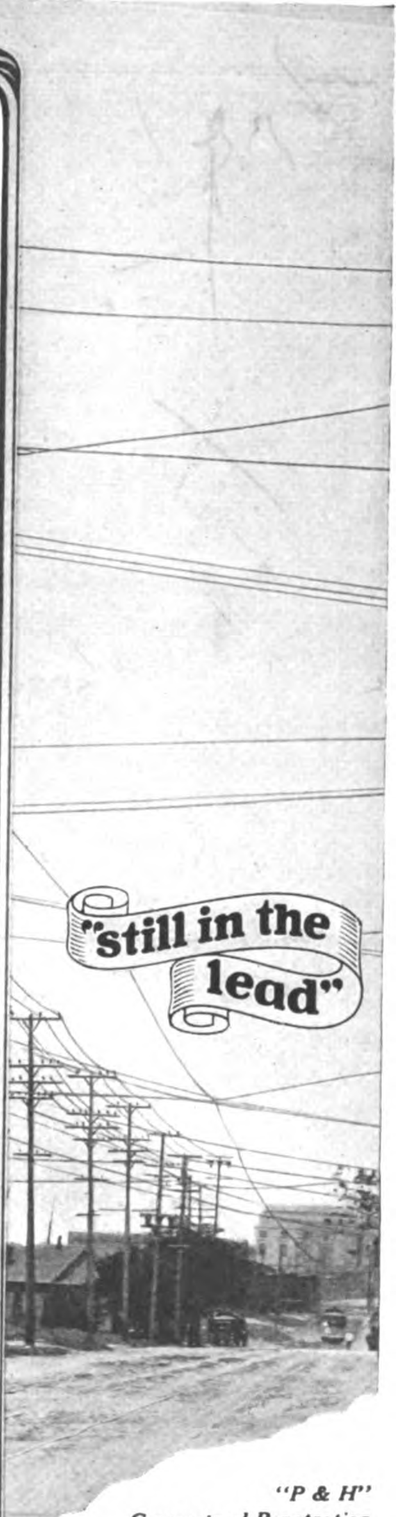

"P & H" Guaranteed Penetration Process Poles in lines of Dallas Power & Light Co., Dallas, Texas

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Grand Rapids, Mich., Powers Bldg.
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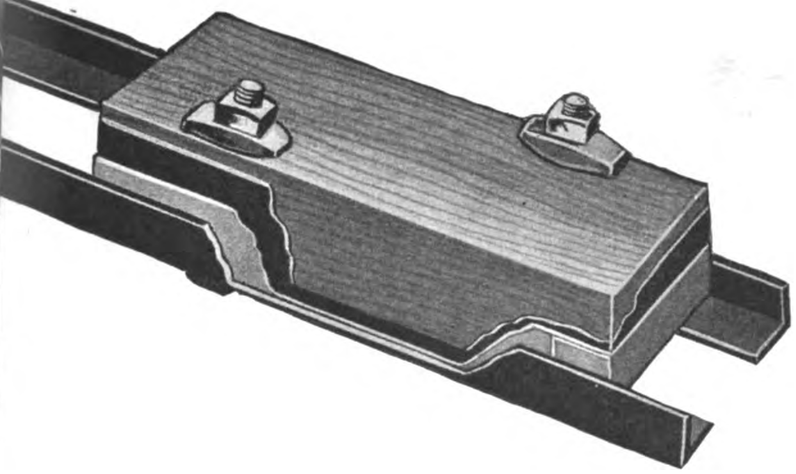
DAYTON

They did not believe they could save $6,000 per mile

—but experience proved that our claim is based on fact

The first cost of track laid on Dayton Resilient Ties is $6,000 per mile cheaper than that laid on wood ties on concrete foundation and $2,000 per mile cheaper than that laid on wood ties on gravel ballast.



RESILIENT TIES will enable you to build *more track* and *better* track for the same money—or the same amount of track for far *less* money.

Consider the saving of $6,000 per mile in concrete roadbed. Considerable. Yet there are reliable figures from Resilient Tie jobs in many parts of the country which supply evidence that this saving has actually been accomplished time and again.

But the mere fact that Resilient Tie jobs *cost less* is not enough. You may also have absolute assurance that Resilient Ties actually provide *better* track than wood ties. Accurate statistics show that not only is maintenance cost greatly reduced, but that the *resiliency* of these modern ties effects a considerable saving in repairs on rolling stock —with less jarring there is less wear, and less wear means longer-lived cars and reduced costs.

Write today
for actual cost figures
on Resilient Tie Track Construction

THE DAYTON
MECHANICAL TIE CO.
706 Commercial Building, Dayton, Ohio
Canadian Representative:
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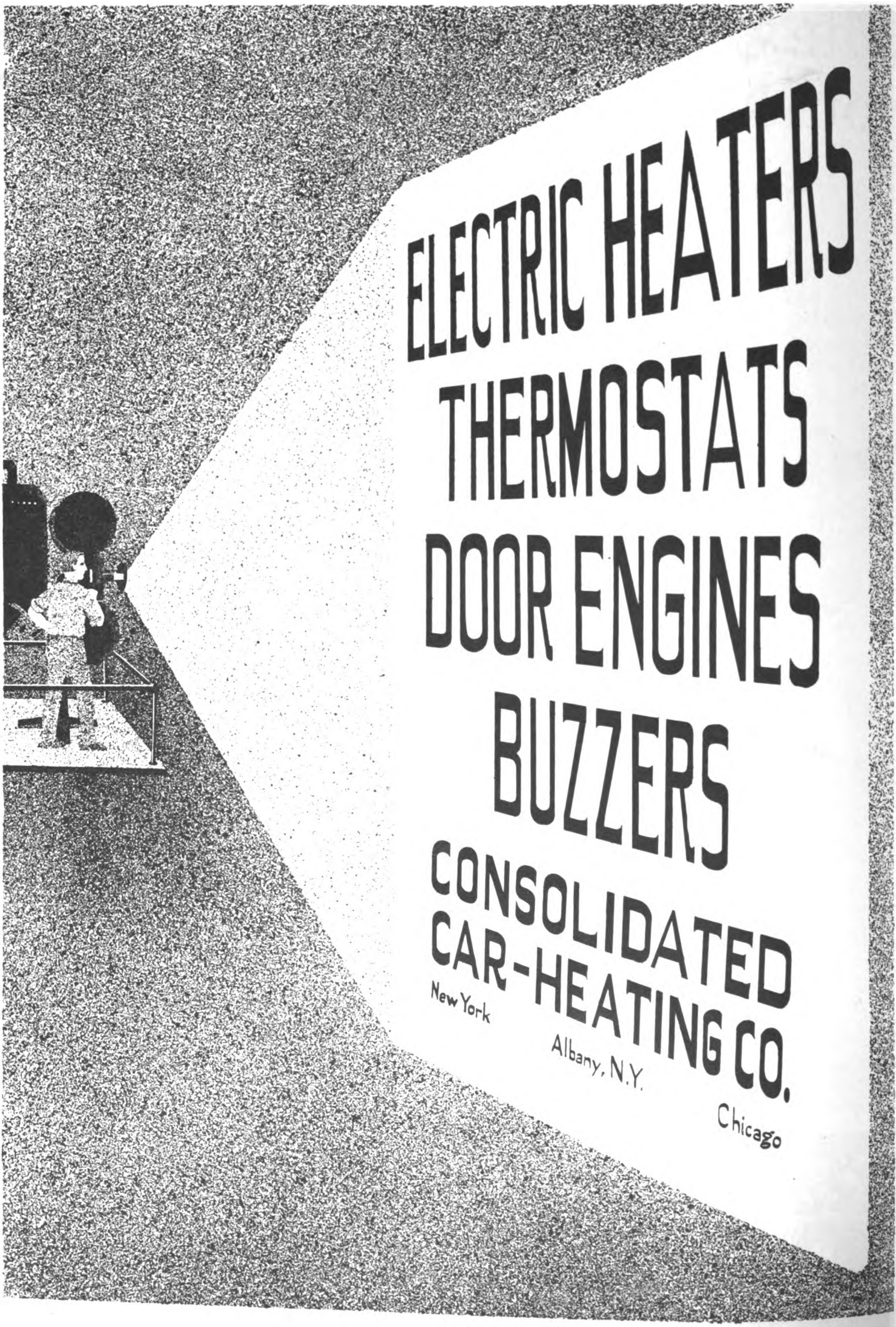
Resilient TIE

— saves first cost !
— saves maintenance !
— saves rolling stock !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NOARK

There is a NOARK FUSE for every
RAILWAY REQUIREMENT
Indicating Nonindicating and Renewable Types

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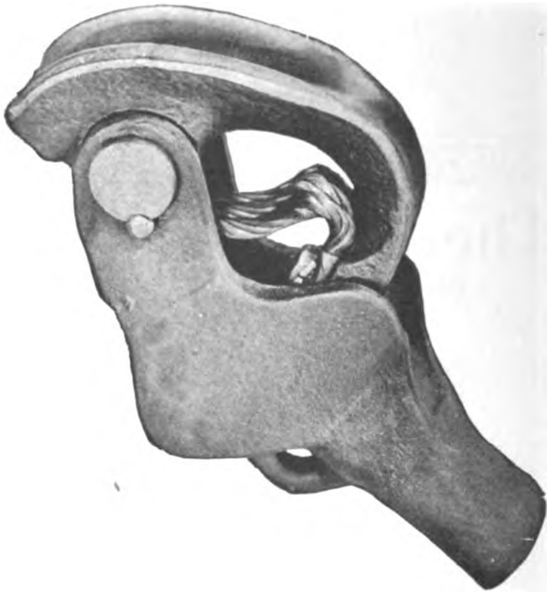
JP

VULCABESTON

Cuba calls

It may be the soft semi-tropical climate—it may be the charm of deep blue Carribean waters, possibly even the absence of prohibition laws may lure—at any rate it's true that Cuba calls—

and the Havana Central R.R. Co. calls for MILLER TROLLEY SHOES



Even from this far-off *Isla de Cuba* come orders for the ever-spreading Miller Trolley Shoe—the sliding contact device which now has proved itself practical, serviceable, and economical on roads all over this Country.

Here are some comments from an official of the Havana Central Railroad: —

"We find that they (Miller Trolley Shoes) hold the wire better than wheels on our lines.

"We get longer life out of a Miller Shoe than a wheel, and also since the installation of them, the cost of maintenance has been very greatly reduced.

"We have had fewer fractures of the trolley wire and fewer dewirements with the Miller Shoes."

Miller Trolley Shoes have a long deep groove which stays on the wire in spite of speed and curves. They do not jump at trolley ears. They cut out arcing and pitting of trolley wire, and operate with less trolley tension.

In every way—Miller Trolley Shoes meet all the requirements for increased efficiency.

Better for your road

Take advantage of the experience of so many others. Install Miller Trolley Shoes on your system and reap the benefits of better service with lower costs.

Write for further information

MILLER TROLLEY SHOE CO.
Boston-21, Mass.
Western Representative:
Economy Electric Devices Co.
1509 Old Colony Bldg., Chicago, Ill.

Safeguard your credit at its source

BANKS are not the source of credit, they are the channels through which it is distributed.

Credit comes from the people of a community—from you and your employees. By rigid economy and self-denial excess dollars are accumulated in the banker's reservoir.

Only when employees have the correct understanding of both life and labor will they contribute their part to the community's wealth. Only when their work yields a profit can you add your share to this necessary credit reserve.

Employees who regard work with a neutral attitude not only cause a heavy loss on your payroll investment—they actually decrease available credit and impair your standing with bankers.

Safeguard your investment in men, and you safeguard credit at its source!

An interesting booklet, "Stopping Payroll Losses," will be sent industrial executives gratis, on request. Please address Dept. D-2.

"The Viewpoint of the Employee is the Most Neglected Asset in Industry."

SHERMAN SERVICE, INCORPORATED

Industrial Co-ordination **Production Engineering**

NEW YORK
2 Rector St.

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Park Building

BOSTON
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1011 Chestnut Street

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First Nat'l Bank Bldg.

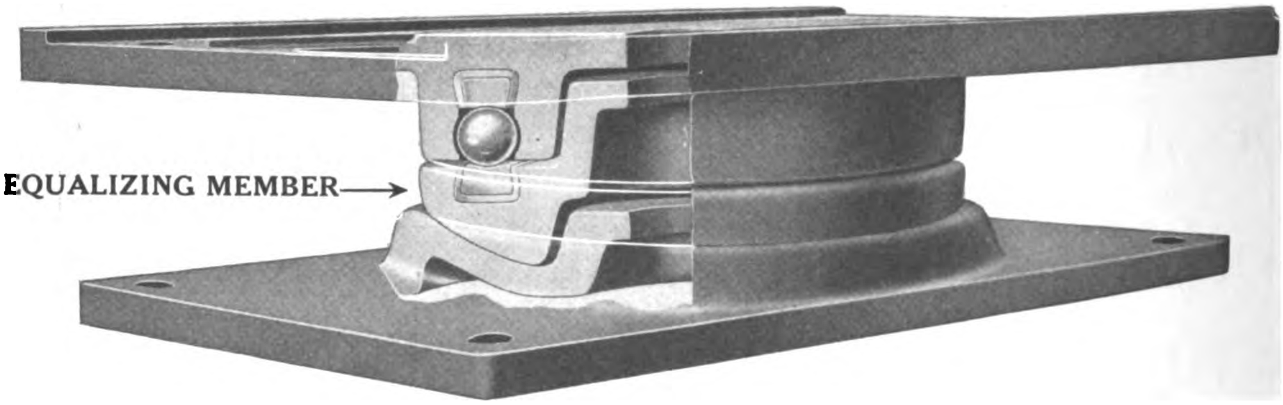
ST. LOUIS
314 N. Broadway

MONTREAL
Drummond Bldg.

TORONTO
10 Adelaide St., E.

Largest organization of its kind in the world

SYMINGTON



The Symington Ball Bearing Center Plate With Equalizing Feature

FROM the earliest days of electric railroading, the money saving value of a free turning truck has been recognized.

Free and easy turning is a certainty with a ball bearing center plate and, when each ball carries its proportion of full load at all times, the ball bearing is the most durable type of bearing known.

Free and easy turning and long life are provided by the Symington Ball Bearing Equalizing Center Plate.

The *intermediate equalizing member* compensates for all tilting of the bolsters and gives to each ball its proportion of the full load.

Investigate the Symington Ball Bearing Equalizing Center Plates.

THE T. H. SYMINGTON COMPANY

New York Chicago Baltimore Boston Montreal
WORKS: ROCHESTER, N. Y.

Lives of human beings are involved, also your claim costs, and yet many times this most important equipment is generalized in your specifications.

You know H. B. Life Guards manufactured by the Consolidated Car Fender Company are the best built. From long experience we have developed a guard that is efficient and low in maintenance—one that can be relied upon in an emergency.

You want our H. B. Life Guard,—then why not be specific and

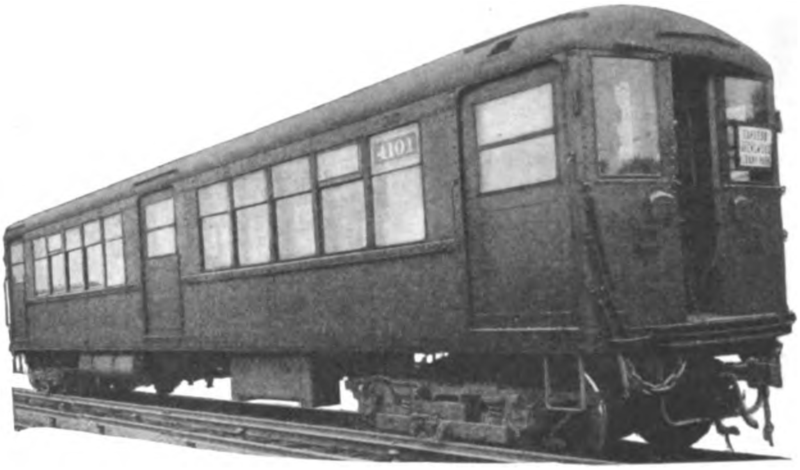
Specify

To be manufactured by the

CONSOLIDATED CAR FENDER CO.

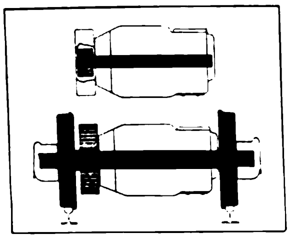
PROVIDENCE, RHODE ISLAND

Wendell & MacDuffie Co., 110 E. 42nd St., New York
Selling Agents



TYPE OF CAR USED BY THE CHICAGO ELEVATED RAILWAYS

Length over all	48'—0"
Width over side sheeting	8'—7"
Weight of Motor Car (No passengers) .	70,500 lbs.
Weight of Trailer Car (No passengers) .	53,700 lbs.
Seating Capacity	52
Number in service as of May 1, 1923 .	184 Motors 66 Trailers
Number under construction as of May 1, 1923	105
Diameter of Motor Wheels . . .	34 inches
Diameter of Trailer Wheels . . .	31 inches
Number of motors per motor car . .	2
Type of Motors	GE—No. 243, and Westinghouse No. 567-R-5.



WHEELS **ARMATURE SHAFTS** **MOTOR AXLES**

"Not only to make better products but to make them better understood—not only to sell but to serve, assisting those who buy to choose as well as use their purchases—this is the privilege if not the practice of all modern manufacturers."—Vauclain.

STANDARD STEEL WORKS COMPAN

PHILADELPHIA, PA.

BRANCH OFFICES

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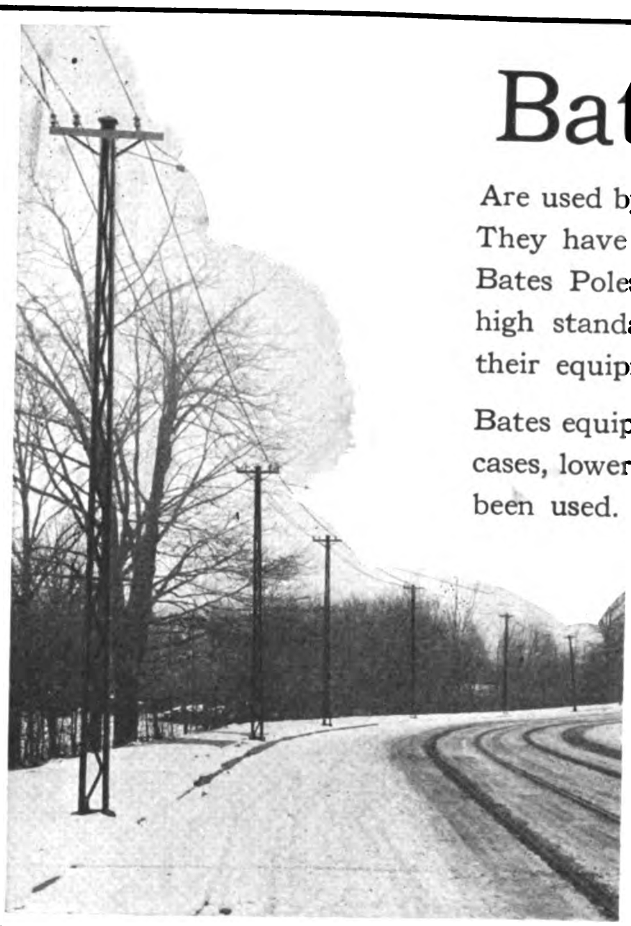


Bates Steel Poles

Are used by recognized leaders in the electrical industry. They have found it both logical and economical to buy Bates Poles—poles of a character consistent with the high standard demanded and specified for the rest of their equipment.

Bates equipped installations have proved, in innumerable cases, lower in initial costs than if substitute poles had been used.

Bates Expanded Steel Truss Co.

ILLINOIS MERCHANTS BANK BLDG.,
CHICAGO, ILL.

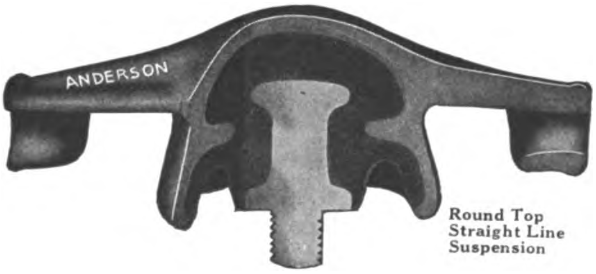
Bates Engineers will gladly co-operate with you in your planning.

BATES ONE PIECE EXPANDED STEEL POLES

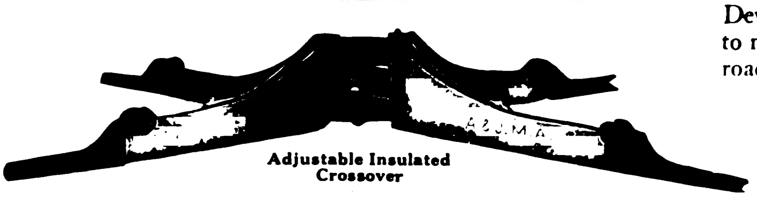
ANDERSON LINE MATERIAL

with

Aetna Insulation



Round Top Straight Line Suspension



Adjustable Insulated Crossover

For over twenty years, Anderson Line Material has been a leader in the field because of its eminently satisfactory and long service. Aetna Insulation has helped to make this reputation for it.

Aetna Insulation is our own special compound. Developed years ago, it has continued ever since to meet the exacting requirements of electric railroad line service.

—Let us send our catalog—

TRADE MARK

Reg. U. S. Pat. Off.

Albert & J. M. Anderson Mfg. Co.

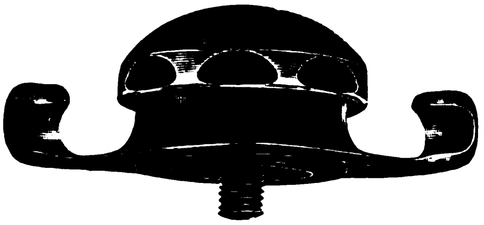
Established 1877

289-293 A St., Boston, Mass.

Branches—New York, 135 Broadway. Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St. London, E C. 4, 38-39 Upper Thames St.

TRADE E A A AETNA MARK REGISTERED

TRADE ELECTROSE MARK
REG. U.S. PAT. OFF. & FOREIGN COUNTRIES.



No. 94424

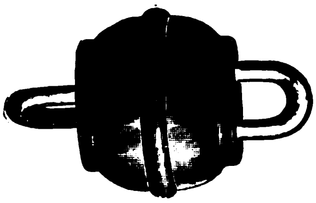
The ideal insulation material for

Electric Railway Insulators

Electrose Insulation needs no introduction. It has long since proven its undoubted superiority from the standpoint both of electrical efficiency and resistance to wear or disintegration.

Our stocks of electric railway standard parts are complete. However, should your requirements demand special designs, our plant is at your service.

Consult us. Bulletins on request.



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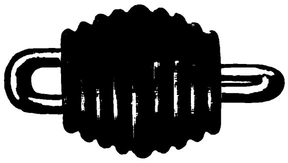

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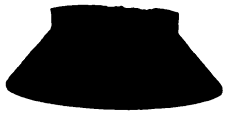

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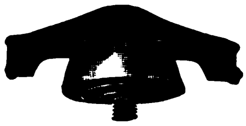

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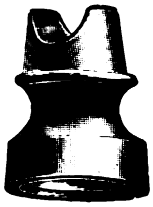

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ELECTROSE MFG. CO.

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66-76 Front St.

27-37 York St.
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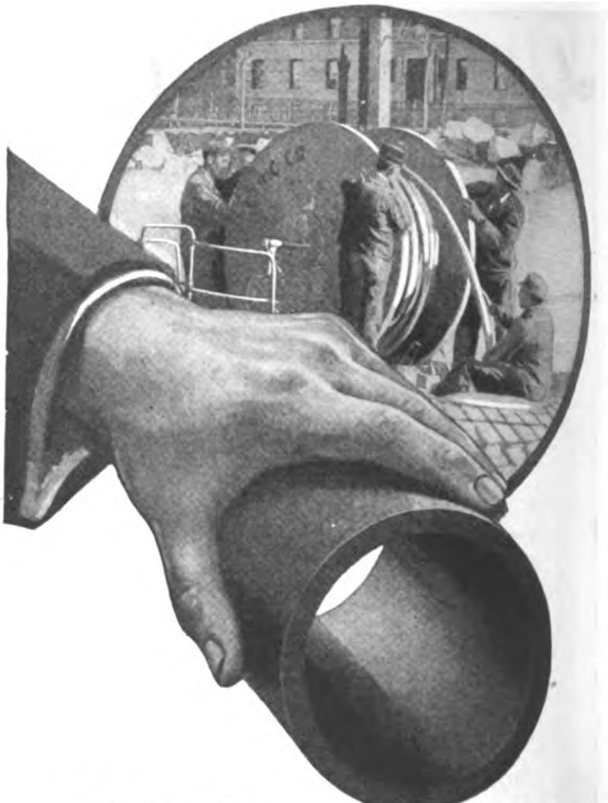
Brooklyn, N. Y.
New England Agents:
CRANE-STOUT, Inc.
10 High Street, Boston



ORANGEBURG FIBRE CONDUIT

The smoothest cableway

THE greater protection which fibre conduit gives its cables starts at the time when they are being drawn in.

Investigation shows that a large number of cable failures are the direct result of damage done in drawing.

Hence, the importance of the smooth bore of Orangeburg Fibre Conduit—cables can be drawn in with the minimum amount of pull, and with no danger from burrs, fragments, or intruding edges of cement.

There is a big ultimate economy in the protection of fibre conduit, not only from this protection in drawing, but in the greater protection it gives after the cables are installed. Replacements are costly in both material and labor, but after all, service interruption is the big cost—and service interruption is far less frequent where fibre conduit is used.

THE FIBRE CONDUIT CO.
REG. U.S. PAT. OFF.
ORANGEBURG
ORANGEBURG, N.Y.

JOHNS-MANVILLE Inc.
Madison Ave. at 41st St., New York City
Branches in 59 Large Cities
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JOHNS-MANVILLE SERVICE COVERS THE CONTINENT
Through—
Electrical Materials
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AND
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JOHNS-MANVILLE

Drew Spring Ear

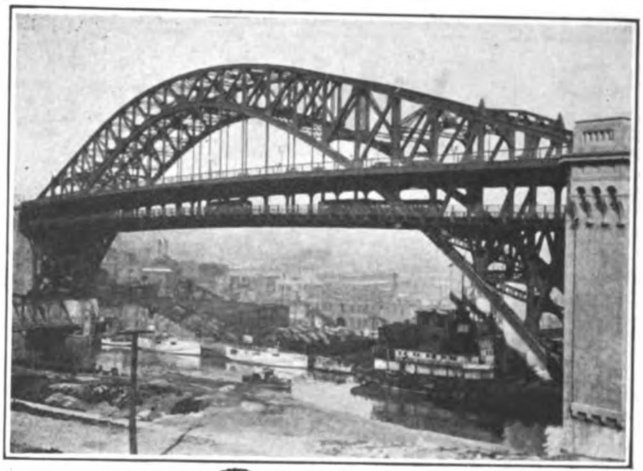
Used in Cleveland's
Huge High-Level Bridge

To the right is a photograph of Cleveland's huge High-Level Bridge completed in December, 1917. After testing different equipment, the DREW SPRING EAR was installed throughout.

The trolley hangers are mounted in a trough which is bolted rigidly to concrete roof. The head room is low and the service very severe. The complete installation consists of 1100 DREW SPRING EARS.

There are approximately 3000 car movements on four tracks through the bridge daily. Average life of ear and wire is two years. Each ear therefore absorbs over a half million wheel passings before it is removed. Some of them are even used on the renewed trolley.

The DREW SPRING EAR eliminates flickering lights and motor surges. Gives a positive spring movement. Does away with destructive wear on trolley wire. Eliminates pounding on trolley wheel, base, hangers and trough structure—insuring quiet and smooth car operation. Many thousands are in use on a large number of properties.



DREW

Other Drew Products

- Complete Line Direct Suspension and Catenary Material
- Reclaiming Pole Sleeves
- Pipe Insulators
- Third Rail Insulators
- High Tension Porcelain
- Motorman's Safety Mirror
- Pole Line Hardware
- Linemen's Tools
- Bronze Castings

Prices and sample sent on request.

Spring with Supporting Boss

The Drew Electric & Mfg. Co.
CLEVELAND, OHIO

LEADERS EDWARDS SINCE 1887

FROM a strictly business point of view, the best service is the most profitable.

Prestige for your road, and a desire to ride in your cars by increasing numbers of passengers are largely built upon the degree of comfort and safety which is built into your equipment.

- Window fixtures
- All metal sash balances
- Sash locks and racks
- Sash lifts
- Anti-rattle compression devices
- Metal stop casings and parting stops
- Top, bottom and side weather stripping
- Steel vestibule trap doors
- Trap door locks and latches

Since 1887 we have been making passenger car devices. Never once during this time have we thought that our responsibility as manufacturers ended until the riding public got complete satisfaction and safety from our products.

This perhaps expresses the ideal upon which our institution was founded and explains why the leading railways of the country continue to specify Edwards devices for their equipment.

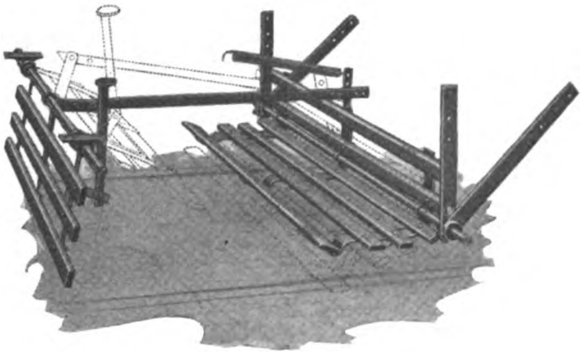
THE O.M.EDWARDS CO., INC.

CHICAGO, ILL

Main Office and Factory:
SYRACUSE, N. Y.

NEW YORK, N. Y.

Root All Spring Steel Life Guard



The guard that works perfectly

Costs no more

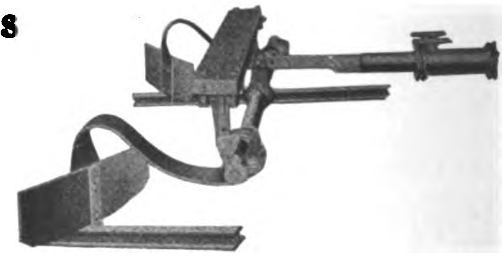
Abundant references gladly furnished to verify the above claims.

Play Safe! Any guard that gives unsatisfactory performance is expensive at any price.

SPECIFY ROOT ALL SPRING STEEL LIFE GUARDS on your cars

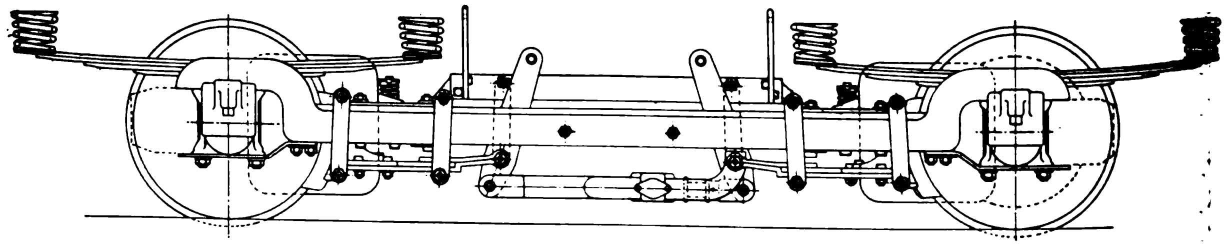
The ROOT SNOW SCRAPER has solved the problem of removing snow from the tracks and keeping the cars on time.

The scraper shown here is our No. 7 for either hand or air operation.



"It Never Fails to Clean the Rails"

ROOT SPRING SCRAPER CO., KALAMAZOO, MICH.



Gould Automatic Slack Adjuster

Specified for One-Man Safety Cars

The leading electric railway companies of this country request Gould Slack Adjusters on their cars. They know that their automatic operation can be depended upon to always keep the brake rigging taut. They also know that the cost of Gould Slack Adjusters is soon saved by reduced wear on brake shoes and lower air consumption for braking, less labor cost and fewer accidents.

Write for full particulars in connection with our types A, B & C adjusters made for every style of car truck.

GOULD COUPLER COMPANY

30 East 42nd St., New York City **Works: Depew, N. Y.** **The Rookery, Chicago, Ill.**

10 seconds to change wheels!

BAYONET

Detachable Trolley Harps

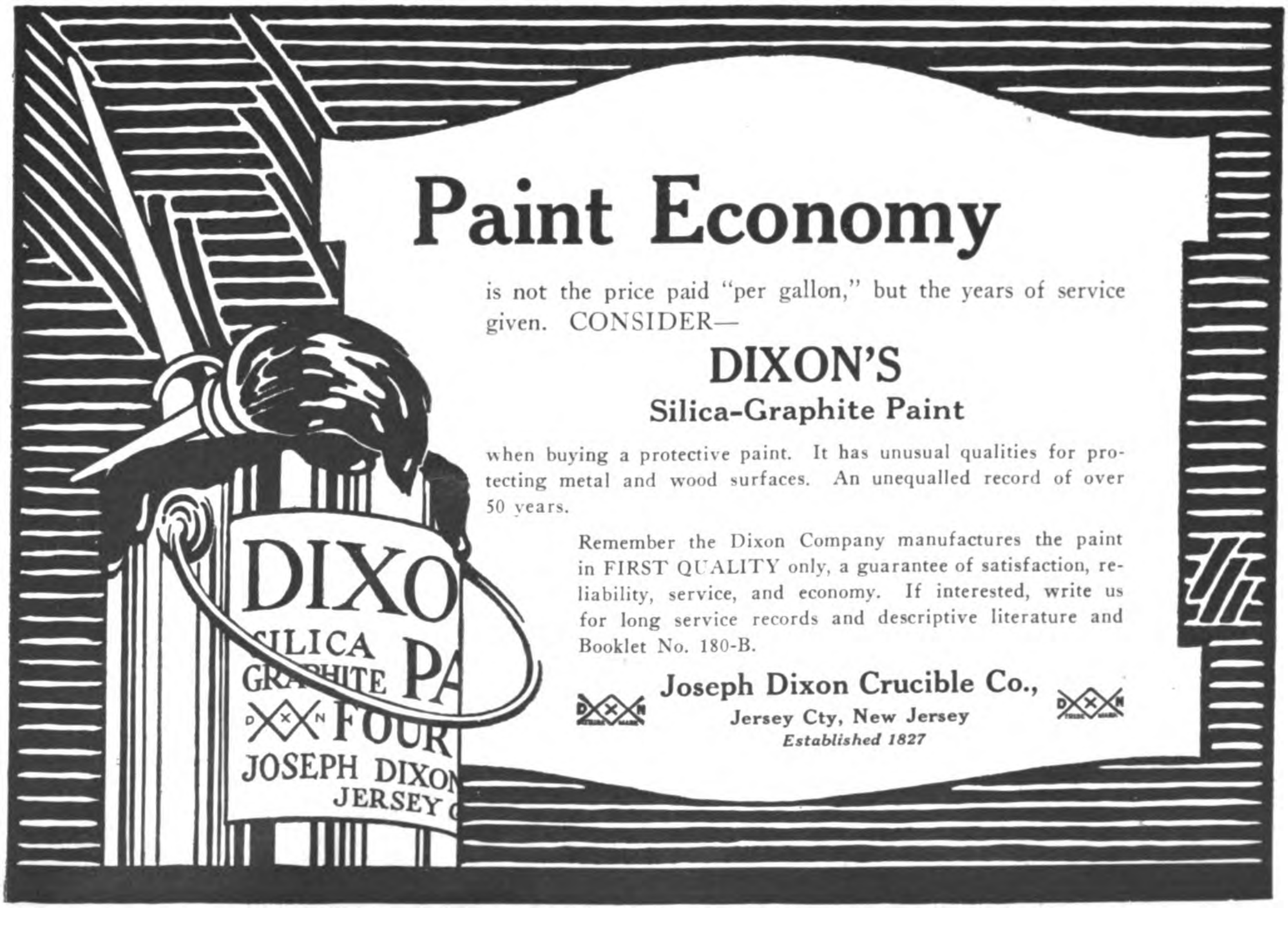
Trolley wheel mileage can be increased and service interruptions reduced when Bayonet Trolley Harps are used. They permit removal of wheel and harp for inspection, lubrication, adjustment or repair. The change is made in a fraction of a minute—no tools needed.

With Bayonet Detachable Harps, there is no need or incentive for running a wheel which needs some minor repair. That's the kind of business which shortens the life of equipment. Bayonet Equipment helps you to prolong its life.

BAYONET
TROLLEY
HARP CO.

Wheels
Sleet Cutters
Bases with Detachable Pole Clamps

Bayonet Trolley Harp Co., Springfield, Ohio



Paint Economy

is not the price paid "per gallon," but the years of service given. CONSIDER—

DIXON'S

Silica-Graphite Paint

when buying a protective paint. It has unusual qualities for protecting metal and wood surfaces. An unequalled record of over 50 years.

Remember the Dixon Company manufactures the paint in FIRST QUALITY only, a guarantee of satisfaction, reliability, service, and economy. If interested, write us for long service records and descriptive literature and Booklet No. 180-B.

Joseph Dixon Crucible Co.,
Jersey Cty, New Jersey
Established 1827

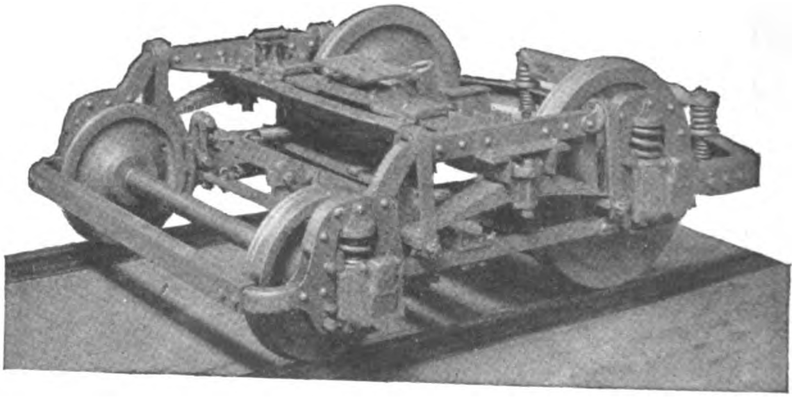
In Nuttall's Employ
But working for *you*

An experienced, skillful crew of heat-treaters and inspectors — to make sure before every gear goes out that it is finished in every respect and represents the best that Nuttall can make.

R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

One of the Baldwin Electric Railway Trucks given highest award by Panama-Pacific Exposition



Baldwin Standard "54-18 M" Electric Motor Truck for City Electric Railway Lines
Gauge, 4 ft. 8½ in. Wheel base, 54 in. Center pin load, 18,000 lb. Driving wheels, diameter 33 in. Idler wheels, diameter, 21 in.

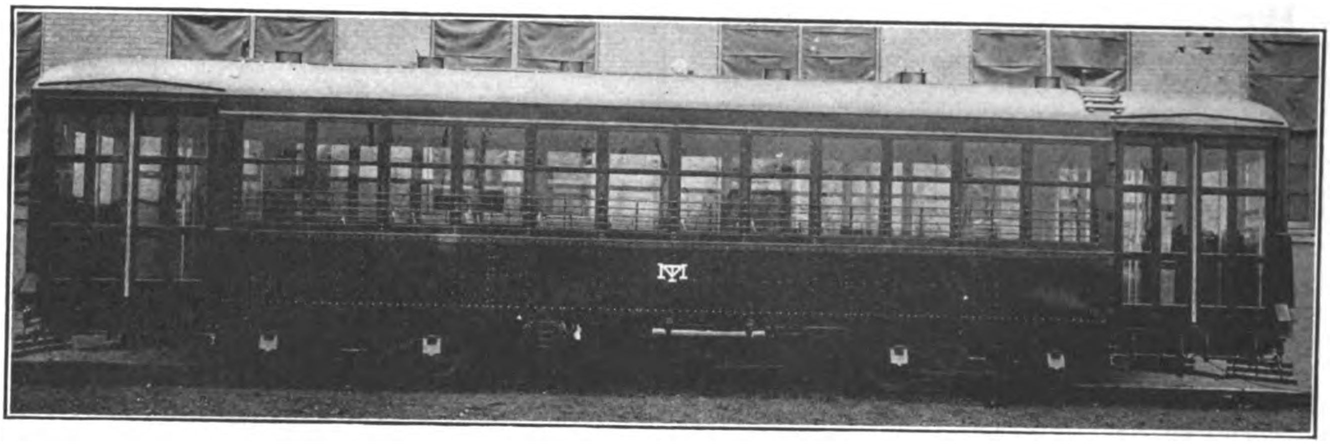
The Baldwin "Single Motor Truck" places the small wheels near the ends of the car, thus providing increased vertical clearance for the car body and platforms. These trucks may also be spaced at a maximum distance between truck centers, promoting steady and easy riding.

Baldwin Motor Trucks are everywhere noted for their simplicity, economy and low cost of maintenance.

Baldwin representatives in all principal countries of the world. Detailed information upon request.

THE BALDWIN LOCOMOTIVE WORKS
PHILADELPHIA, U. S. A.
Cable Address, "Baldwin, Philadelphia"

St. Louis Quality Cars

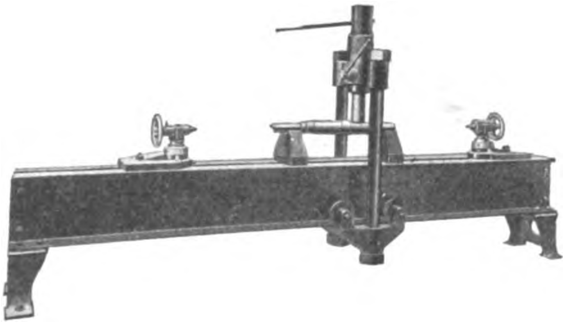


New City Cars for Muskegon Traction and Lighting Co.

With entrance and exit doors on all four corners of their double truck, double-end cars, they are suitable for one-man or two-man operation. The cars are 44 ft. 7 in. long over-all and have a seating capacity of 44 passengers. They are mounted on St. Louis AM-64 arch-bar trucks, equipped with four 25 hp. motors.

St. Louis Car Company
St. Louis, Mo.
"The Birthplace of the Safety Car"

Further particulars sent upon request

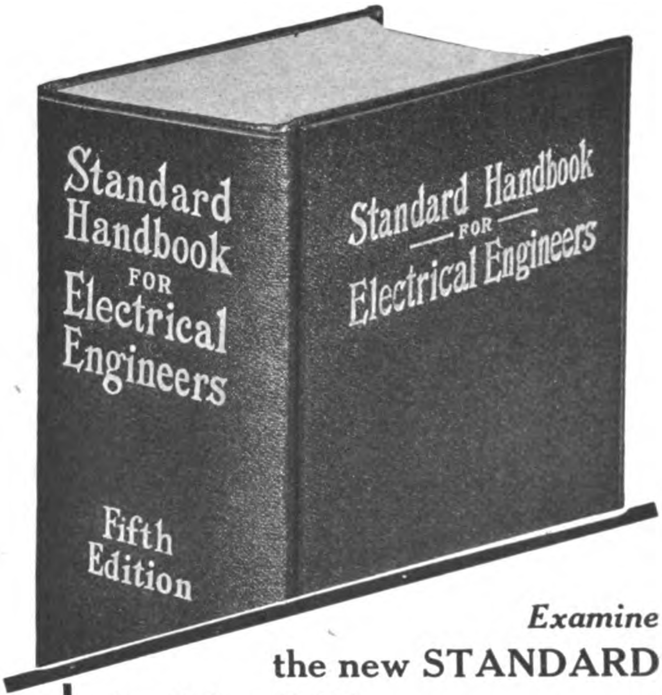


The COLUMBIA Straightener Axle

This improved type is operated by hydraulic pressure—hand applied.

COLUMBIA MACHINE WORKS

3313 Atlantic Ave., Brooklyn, N. Y.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Fifth Edition
Standard Handbook FOR Electrical Engineers

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The new fifth edition of the STANDARD HANDBOOK contains so much practical information on modern electrical engineering that practically every electrical engineer who sees it, buys it.

In five weeks the entire large first printing of this new edition was exhausted, and orders have kept piling up. Now a new second printing is ready.

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for
ELECTRICAL ENGINEERS

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Assisted by a staff of more than 60 specialists
Fifth Edition, Revised and Enlarged
2139 pages, 4½ x 7, flexible. Thumb-indexed, fully illustrated, $6.00 net, postpaid.

More than 60 well-known electrical engineers have prepared the material for this new fifth edition with the daily reference requirements of the practising engineer constantly in mind.

They have made this book the right handbook for you—the one great handbook for your everyday needs.

They have made usefulness its keynote.

They have covered thoroughly the whole field of modern electrical engineering.

The new developments, the impressive progress of electrical engineering, are all thoroughly described and recorded.

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You may send me on 10 days' approval **Standard Handbook, New Fifth Edition, $6.00 net.** I agree to pay for the book or return it postpaid within 10 days of receipt.

Regular subscriber to Electric Railway Journal? ....
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Another

"Up to the minute" test on

"Tool Steel"

vs.

Special Quenched

The "Tool Steel" pinion wore out after 239,136 miles.

Special quenched pinions wore out in 50,000 to 60,000 miles.

The History of the test:

In Dec., 1917, test was started to demonstrate if "Tool Steel" could meet the guarantee of 50% greater life. (Guarantee has since been increased to 75% greater). Car No. 14 was equipped for test with "Tool Steel" gear and pinion on one motor and quenched gear and pinion on another. Micrometer measurements were taken and in the first 29,778 miles, the relative wear on the pinions was .020 in. to .078 in. The quenched pinion was removed and scrapped between 50,000 and 60,000 miles. (Exact record was lost. This mileage checks with the fact that it was half worn in 29,778 miles, also with average mileage they were obtaining for similar pinions on other cars). The "Tool Steel" pinion was worn out in 239,136 miles.

4 to 1
and we guaranteed 75% greater life!

The Tool Steel Gear & Pinion
Company
Cincinnati, Ohio

AMERICAN ELECTRICAL WORKS
AMELECTRIC
Wires and Cables
PHILLIPSDALE, R.I.
Reg. U. S. Pat. Office

Incandescent Lamp Cord

AMELECTRIC PRODUCTS
BARE COPPER WIRE AND CABLE
TROLLEY WIRE
WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
MAGNET WIRE

AMERICAN ELECTRICAL WORKS
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Cincinnati, Traction Bldg; New York, Pershing Sq. Bldg.

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Highway Crossing Bells
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NACHOD SIGNAL COMPANY, INC.
LOUISVILLE, KENTUCKY.

Shaw Lightning Arresters
Standard in the Electric Industries
for 35 years
Henry M. Shaw
150 Coit St., Irvington, Newark, N. J.

U. S. ELECTRIC
AUTOMATIC SIGNAL
for single track block signal protection
United States Electric Signal Co.
West Newton, Mass.

Peirce Sign Hangers
For Span Wires
Always keep the signs vertical
HUBBARD & COMPANY
Pittsburgh Chicago

ROEBLING
INSULATED WIRES AND CABLES
JOHN A. ROEBLING'S SONS CO., TRENTON, NEW JERSEY

Lapp Insulators
Lapp Insulator Co. Inc. Le Roy, N.Y.
Trade Mark

We are prepared
to handle any high grade proposition where
VARNISHED CAMBRIC
Wires and Cables
are required.
When using *quality* Wires and Cables use *quality* Tapes.
"MANSON" Tape, "OKONITE" Tape, "DUNDEE" Tapes
THE OKONITE CO., Passaic, N. J.
Incorporated 1884
OKONITE
TRADE MARK.
Sales Offices:
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SAN FRANCISCO
Agents: Central Electric Co., Chicago, Ill.; Pettingell-Andrews Co., Boston, Mass.; The F. D. Lawrence Electric Co., Cincinnati, Ohio; Novelty Electric Co., Philadelphia, Pa.

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BARE AND INSULATED
Rome Merit Wins Customers
Rome Service Holds Them
ROME WIRE COMPANY
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Chapman
Automatic Signals
Charles N. Wood Co., Boston

STANDARD
WIRES, CABLES AND CABLE ACCESSORIES
Manufactured by STANDARD UNDERGROUND CABLE CO.
Boston, New York, Philadelphia, Washington, Pittsburgh, Chicago, Detroit,
St. Louis, San Francisco

Transmission Line and Special Crossing
Structures, Catenary Bridges
WRITE FOR OUR NEW DESCRIPTIVE CATALOG
ARCHBOLD-BRADY CO.
Engineers and Contractors SYRACUSE, N. Y.

ANACONDA
TROLLEY

The Baker
Wood Preserving Company
CREOSOTERS
Washington Court House, Ohio

Cross Ties Bridge Timbers
Lumber Posts
Piling

Treated and Untreated

We solicit your inquiries

Creosoting Plant located
Washington Court House, Ohio
On—Penna. R.R., B. & O. R.R., D. T. & I. R.R.
Operating Mills in Southern Ohio

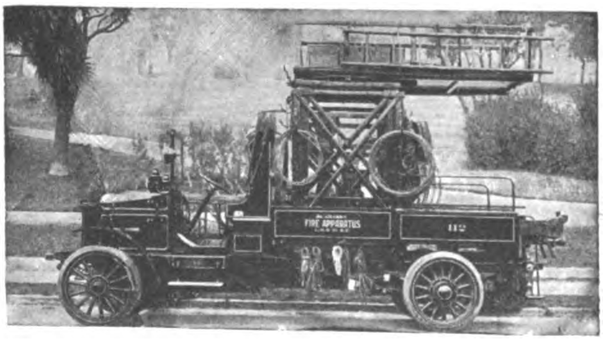
Drip Points for Added Efficiency

They prevent creeping moisture and quickly drain the petticoat in wet weather, keeping the inner area dry.

The Above Insulator—No. 72—Voltages—Test—Dry 64,000. Wet 31,400. Line 10,000.

Our engineers are always ready to help you on your glass insulator problem. Write for catalog.

Hemingray Glass Company
Muncie, Ind.
Est. 1848—Inc. 1870



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TRENTON TOWER
This 3-Section

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The top section is reinforced by the intermediate section. The 3-section design makes it possible to raise the platform 16 inches higher and drop it 12 inches lower than can be done with the old-style 2-section tower.

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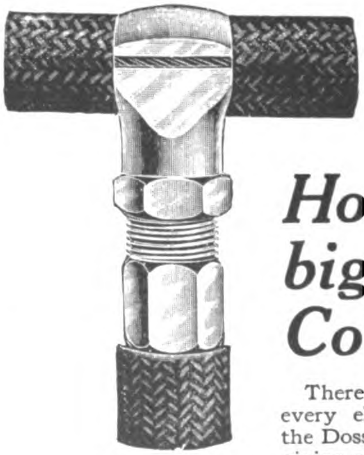

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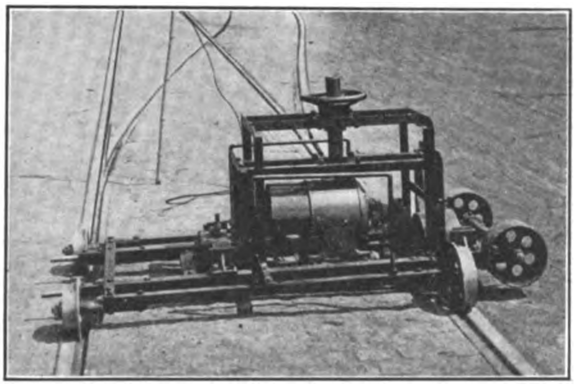

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In fact, the Seymour "Midget" Rail Grinder will meet all the grinding requirements of your track-work program. It is light, portable, operated by one man and does highly satisfactory work.

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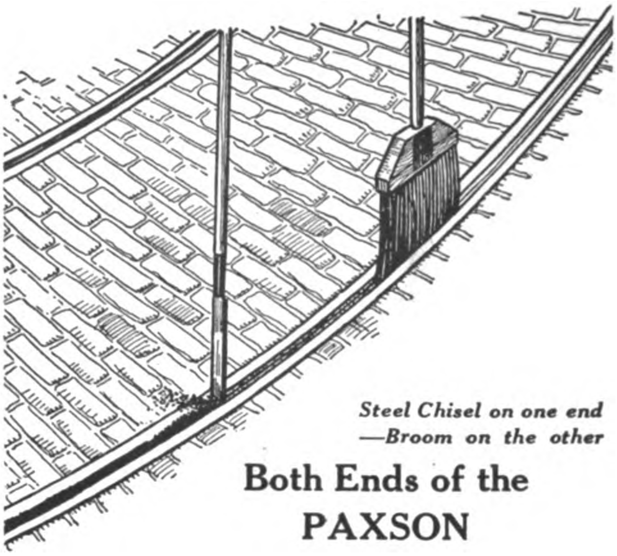

Steel Chisel on one end
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Both Ends of the
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Track Broom are *Business* Ends

—for which reason they have been the choice of railway men for 25 years.

Made of flat steel spring wire. Fits frogs, switches and grooves. Has strong ash handle with steel chisel on other end. Broom is light in weight but strong in construction. Send for a sample—you will be pleased.

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Assuming 30 ft., 70 lb., A. S. C. E. rails and a well-known make and type of bond, the cost of bonding five miles of track is $1,318.50.

The resistance of each bond, under perfect conditions, is equal to 2.51 ft. of unbroken rail.

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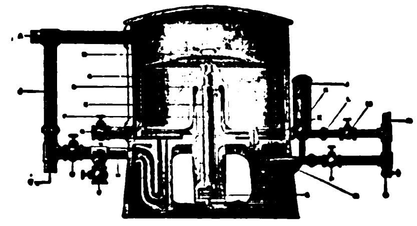

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This oil extracting machine is reclaiming hundreds of gallons of perfectly good lubricating oil and many pounds of waste for the Milwaukee Electric Railway & Light Co. as well as many other companies. It will do the same for you. It is widely used as a real economy producing equipment.

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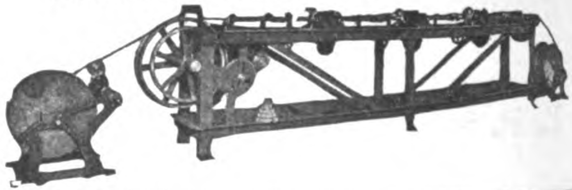

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is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

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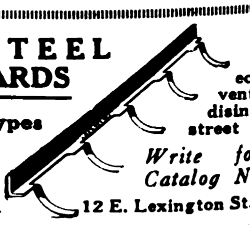
Adapted to all types of rails and paving.



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Type ET | head
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Type AT-F | head
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The Electric Railway Improvement Co.
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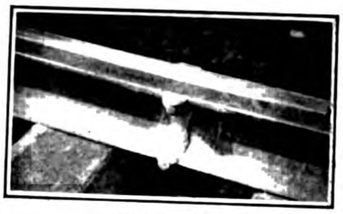
An up-to-date and most economical process for the Aluminothermic welding of rail joints. Makes the joint stronger than the rail itself.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The Differential Steel Car Co.
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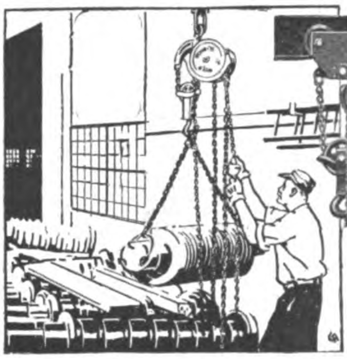

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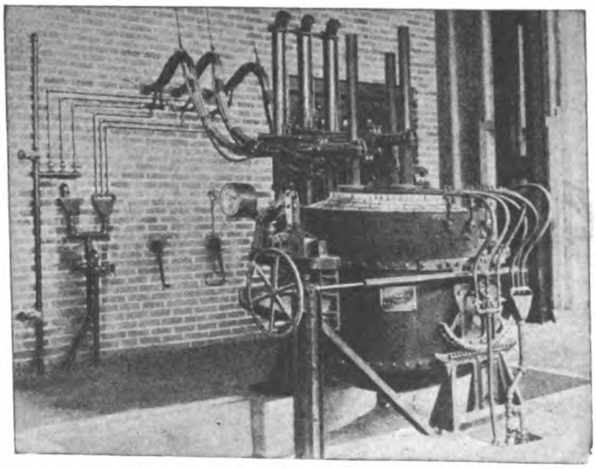

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Make Your Own Castings

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Advantages of Aluminum Field Coils—

Permanent insulation.
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PERFECT
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ELECTRICAL INSULATION

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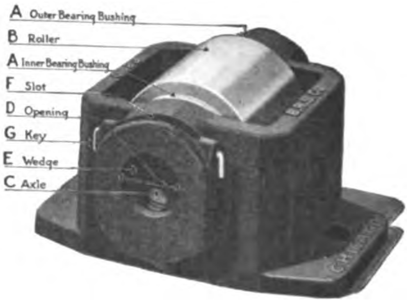
Unlimited Travel



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Permits Maximum Speed with Greatest
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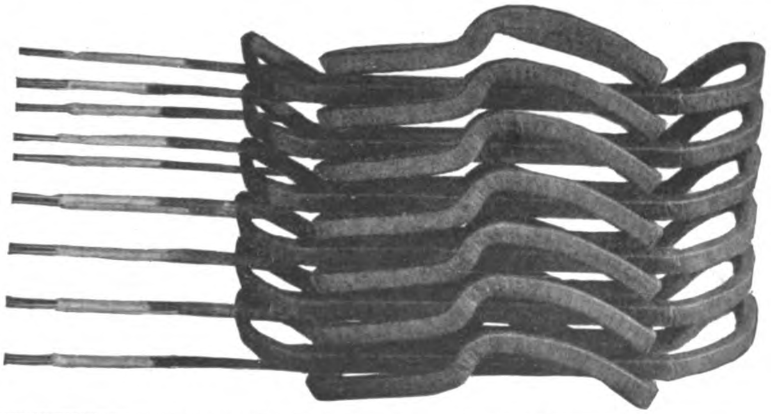

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We make a specialty of

ELECTRIC RAILWAY LUBRICATION

We solicit a test of TULC
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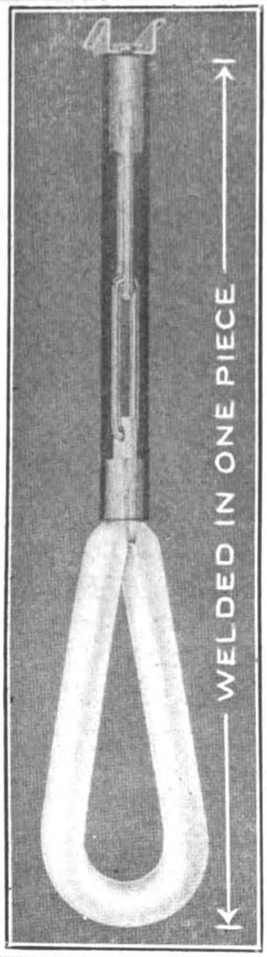

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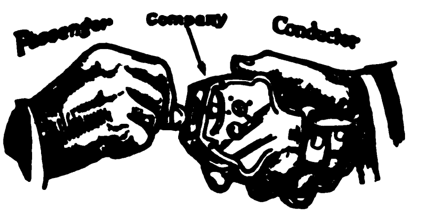

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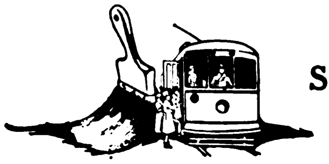

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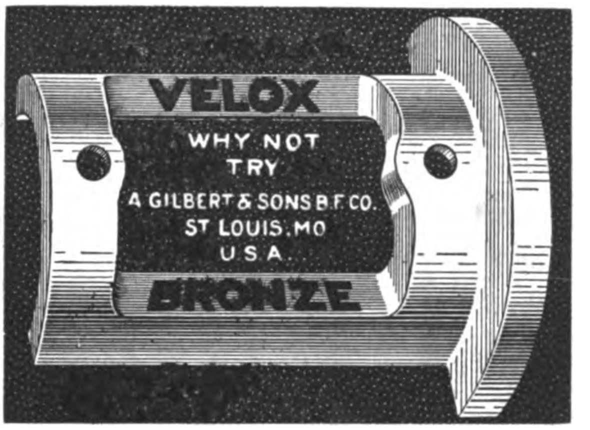

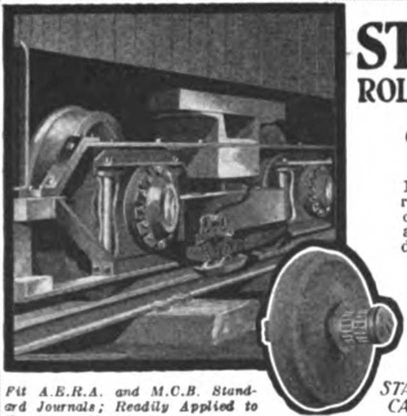
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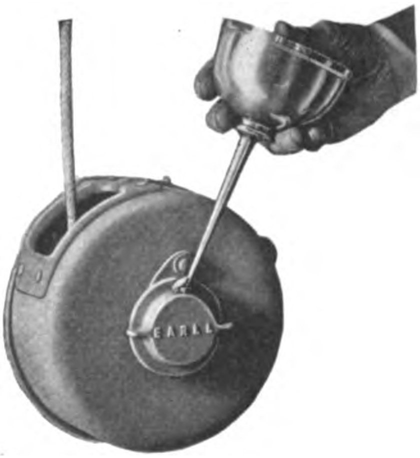

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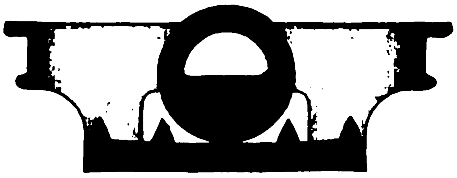
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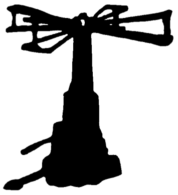
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KASS SAFETY TREADS
HIGH
in efficiency and lasting qualities
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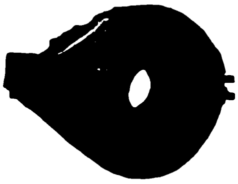
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about the same figure—

why did they decide to give JONES the order?

Because they *knew* Jones as a dealer who could render the best service. True, none of them had ever been to his plant or warehouse. None of them had dealt with Jones before. But week after week *they had seen his advertising.* And other business acquaintances whom they had asked for advice regarding a reliable dealer had all replied: "Try *Jones.*" They, too, had seen the advertising until the name "Jones" became naturally linked with good service, big stocks, prompt delivery. Jones didn't advertise to do a mail-order business in equipment *but to build up prestige*—steady, week-after-week publicity that finally dominated his field.

You can substitute the name of your company for the name "Jones" if you

Keep Advertising in the

SEARCHLIGHT SECTION

POSITIONS WANTED

GRADUATE civil engineer, widely experienced in all forms of transportation, steam and municipal; specialist in problems of electric railway efficiency, routing, extensions, schedules, etc.; thoroughly conversant with urban transportation economics and operation methods; energetic and capable executive with keen, analytical mind, at present engaged but desires change of activities. PW 577, Electric Railway Journal, 10th Ave at 36th St., New York.

SUPERINTENDENT of transportation, with a proven successful record of nineteen years on city, suburban and interurban properties, solicits correspondence with managers who are in need of a capable, efficient superintendent; successful in dealing with public and labor; recognized as an operating official who gets results; at present with large property; personal reasons for desiring a change. High grade references furnished as to ability to take over any property and get results. PW-568, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

SALESMEN WANTED

Sales Engineer Wanted

To call on railway signal and electrical departments, power companies and traction lines. Headquarters in Chicago. Please state age, experience and salary expected. SW-578, Elec. Railway Jour., Old Colony Bldg., Chicago, Ill.

FOR SALE

25-Ton All Steel

BALDWIN ELECTRIC LOCOMOTIVE

Fully Equipped

Excellent Condition

Immediate Delivery

FS-566, Electric Railway Journal
10th Ave. at 36th St., New York City

WANTED TO PURCHASE

SECOND HAND EQUIPMENT

CLOSED TRAILERS

Two-side entrance, with seating capacity approximately 50 people, steel structure preferred and equipped with air-operated doors, air-brake equipment, electric heaters and for standard gauge.

W-579, Elec. Railway Journal,
Real Estate Trust Bldg., Philadelphia, Pa.

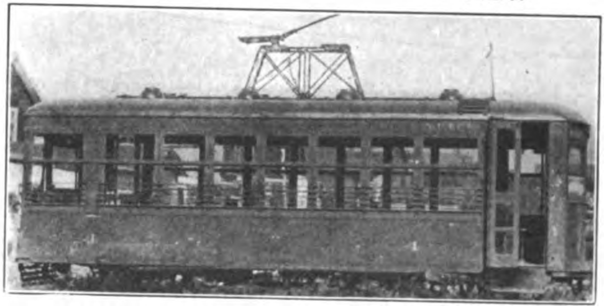
COMPRESSOR

1—Laidlaw-Dunn-Gordon electrically operated, horizontal, duplex, twin tandem, four stage, for 1000 cu. ft. displacement to 1000 lbs. pressure at 112 r.p.m., size 14½ in. x 8⅞ in. x 6⅞ in. x 4 in. x 24 in. Driven by a 400-hp., 2200 v., 25 cy., 3 ph., slip ring induction motor; mounted directly upon the crank shaft. Floor space, 16 ft. x 42 ft. Condition, fair. Will sell at bargain price. Make us an offer.

Write T. S. DUNCAN

P. O. Box 940, Pittsburgh, Pa.

FOR SALE—PRACTICALLY NEW



40 Birney One Man Cars

WITH ALL SAFETY ATTACHMENTS

Built by Brill or Bradley. Cross seats, seating 34. Westinghouse DH-16 or General Electric CP-27 Air Compressors; Electric Heaters, Johnson fareboxes, Root track scrapers and many other extra fittings.

These cars have been used only several weeks. They will be painted and lettered to suit purchaser. They will have the appearance of new cars when delivered and may be represented as such.

Trucks and Motor Equipment

Brill 79-E Trucks, 8 ft. wheel base, 26 in. steel wheels. Whs. 508 or G. E. 264 Motors.

2 Controllers for double end operation.

Code—"Clane"

TRANSIT EQUIPMENT CO., 501 Fifth Avenue, New York

FOR SALE

25 SAFETY CARS

The Department of Street Railways, City of Detroit, is offering for sale 25 single truck, double end Safety Cars, equipped with electric heaters, thermostats, headlinings, center lighting, opal shades, air-operated National R-7 registers, air-operated snow scrapers, steel wheels and approximate weight of cars is 17,000 pounds.

This equipment is approximately two years old and may be inspected by calling at the Department of Street Railways, Detroit, Michigan.

Proposals are solicited for all or any part of the above offering and these may be directed to Geo. J. Finn, Commissioner, Department of Purchases and Supplies, 710 Marquette Building, Detroit, Michigan.

These proposals will be opened on Thursday August 2nd, 1923 at 10:30 A.M. at which time consideration will be given to all bids submitted.

FOR SALE

3—J. G. Brill One Man Safety Cars

Equipped with 2 G. E. No. 67 Motors, G. E. B23 Controls 35 ft. long, single truck, good condition.

Immediate shipment. Further information on request.

WEST VIRGINIA UTILITIES CO.

MORGANTOWN, W. VA.

WANTED

TRACK SCALE

Second hand

of standard make, minimum sixty ton per section and 50 foot weigh rail length, in first class condition.

R. B. Campbell, Gen'l Mgr.
The Arkansas Valley Interurban Ry. Co.
Wichita, Kansas

FOR SALE

20—Peter Witt Cars

Weight Complete, 33,000 lbs.

Seat 53. 4—G. E. No. 258-C Motors. K-12-H Control, West. Air Taylor Trucks. R.H. Type. Complete.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

INVESTIGATE
JOBBERS
BUILDERS
MANUFACTURERS
DEPARTMENT STORES
RETAILERS
Rehber

Why the storm many expected did not arrive — *is worth investigating*

If ever proof were needed that government in business does not necessarily mean turmoil, the liquidation activities of the War Department furnish the evidence.

When the Director of Sales Office took hold in 1919, the Jeremiahs of the land had a wonderful time. The dumping of surplus property was to put an old man of the sea on to American business.

But nothing like that happened. There was none of this so-called dumping. Instead, the Director of Sales Office, working with the representatives of industry and commerce, liquidated this surplus in a manner that showed that sometimes a government can do a good job, outside its realm.

The average business man has hardly realized that over two and a half billion dollars' worth of merchandise has found its way back to the usages of peace.

You ought to know it not only because it embodies why the storm never arrived, but because every sale of Surplus Property holds potential possibilities of profit for you.

The War Department strongly emphasizes the importance of investigating opportunities at this particular time when the final sales are being planned. Investigation will disclose a minimum of the final tag-end remnants usually associated with wind-ups of this character. The materials remaining on hand are, in large part, the high grade merchandise that was reserved by the Army for emergency purposes.

It is up to you to investigate.

The Way to Investigate

Watch your Commercial Business Publication and the Metropolitan Dailies for announcements of specific auction or sealed bid sales.

Send for the Catalog mentioned in the announcement.

Check off the items that interest you.

Send a representative to the sale to inspect the materials—in advance, *if possible.*

To ensure you more leeway, send your name and address at once to Major J. L. Frink, Chief, Sales Promotion Section, Room 2515, Munitions Building, Washington, D. C. Advise him the character of materials you are interested in, and catalogs containing such materials will be forwarded you as rapidly as sales are scheduled.

Final commodity sales will begin in September and continue until liquidation of stocks is completed at the Quartermaster Depots in Brooklyn, Chicago, San Antonio and San Francisco. Offerings include a wide range of Quartermaster Supplies, Ordnance Property and smaller quantities of Engineer Property, Chemical Warfare and Medical and Hospital Supplies.

Important sales of Real Estate, Buildings, Plants and Warehouses will be held at Camp Devens, Ayer, Mass.; Curtis-Elmwood Air Depot, Buffalo, N. Y.; Camp Dix, N. J.; Ordnance Reserve Depot, Amatol, N. J.; Camp Meade, Md.; Ordnance Reserve Depot, Toledo, O.; Camp Knox, Louisville, Ky., and Camp Lewis, American Lake, Wash. Definite dates will be announced later

Look for the Eagle before you shop.

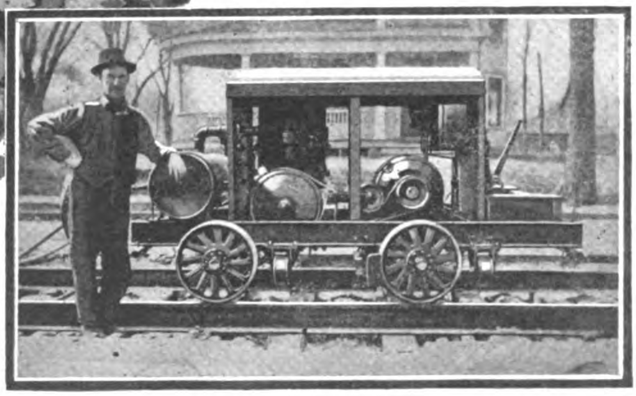
WAR DEPARTMENT

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.
Air Circuit Breakers
Roller-Smith Co.
Air Receivers & Aftercoolers
Ingersoll-Rand Co.
Ammeters
Roller-Smith Co.
Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Drew Elec. & Mfg. Co.
Western Electric Co.
Westinghouse E. & M. Co.
Armature Shop Tools
Armature Coil Equip. Co.
Elec. Service Supplies Co.
Automatic Return Switch Stands
Ramapo Ajax Corp.
Automatic Safety Switch Stands
Ramapo Ajax Corp.
Axles
Bemis Car Truck Co.
St. Louis Car Co.
Standard Steel Works
Axle Straighteners
Columbia M. W. & M. I. Co.
Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Westinghouse E. & M. Co.
Babbitt Metal
Ajax Metal Co.
More-Jones B. & M. Co.
Babbitting Devices
Columbia M. W. & M. I. Co.
Badges and Buttons
Elec. Service Sup. Co.
Int. Register Co., The
Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Drew Elec. & Mfg. Co.
General Electric Co.
Gilbert & Sons B. F. Co., A.
St. Louis Car Co.
Westinghouse E. & M. Co.
Bearings, Center and Roller Side
Baldwin Locomotive Works
Burry Railway Supply Co.
Stucki Co., A.
Bearings, Roller
Stafford Roller Bearing Car Truck Corp.
Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Heati'g Co.
Elec. Service Sup. Co.
St. Louis Car Co.
Western Electric Co.
Boilers
Babcock & Wilcox Co.
Bond Testers
Amer. Steel & Wire Co.
Elec. Service Sup. Co.
Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Railway Track-Work Co.
Western Electric Co.
Bonds, Rail
Amer. Steel & Wire Co.
Drew Elec. & Mfg. Co.
Elec. Ry. Improvement Co.
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Railway Track Work Co.
Western Electric Co.
Westinghouse E. & M. Co.
Bond Testers
Roller-Smith Co.
Book Publishers
McGraw-Hill Book Co.
Boxes, Switch
Johns-Pratt Co.
Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
American Bridge Co.
Bates Exp. Steel Tr. Co.
Drew Elec. & Mfg. Co.
Electric Ry. Equipment Co.
Elec. Service Sup. Co.
Hubbard & Co.
Ohio Brass Co.
Western Electric Co.
Brake Adjusters
Gould Coupler Co.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.
Brake Shoes
Amer. Br. Shoe & Fdy. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Brakes, Brake Systems and Brake Parts
Ackley Brake & Sup. Corp.
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Johns-Manville Co.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.
Brooms, Brushes, Etc.
Worcester Brush & Scraper Co.
Brooms, Track, Steel and Rattan
Amer. Rattan & Reed Mfg. Co.
Paxson Co., J. W.
Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse E. & M. Co.
Brushes, Wire, Pneumatic
Ingersoll-Rand Co.
Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Bunkers, Coal
American Bridge Co.
Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.
Bus Seats
Hale & Kilburn Corp.
Heywood-Wakefield Co.
Bushings
National Vulcanized Fibre Co.
Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.
Cables. (See Wires and Cables)
Cambric Tapes, yellow and black varnished
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Carbon Brushes (See Brushes, Carbon)
Car Panel Safety Switches
Westinghouse E. & M. Co.
Cars, Dump
Differential Steel Car Co.
Car Lighting Fixtures
Elec. Service Sup. Co.
Car Panel Safety Switches
Consolidated Car Heati'g Co.
Cars, Passinger, Freight, Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.
Cars, Gas, Rail
St. Louis Car Co.
Cars, Second Hand
Electric Equipment Co.
Transit Equipment Co.
Cars, Self-Propelled
General Electric Co.
Car Signal System
Fahnestock Elect. Co.
Castings, Brass, Composition or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Drew Elec. & Mfg. Co.
Castings, Gray Iron and Steel
American Bridge Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Standard Steel Works
Castings, Malleable and Brass
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Catchers and Retrievers, Trolley
Carll, Chas. I.
Elec. Service Sup. Co.
Ohio Brass Co.
Trolley Supply Co.
Wood Co., Chas. N.
Catenary Construction
Archbold-Brady Co.
Western Elect. Co.
Change Carriers
Cleveland Fare Box Co.
Circuit-Breakers
General Electric Co.
Roller-Smith Co.
Westinghouse E. & M. Co.
Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Dossert & Co.
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Cleaners and Scrapers Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Root Spring Scraper Co.
St. Louis Car Co.
Clusters and Sockets
General Electric Co.
Coal ad Ash Handling (See Conveying and Hoisting Machinery)
Coil Banding and Winding Machines
Armature Coil Equip. Co.
Columbia M. W. & M. I. Co.
Elec. Service Sup. Co.
Coils, Armature and Field
Columbia M. W. & M. I. Co.
Economy Electric Devices
Elliott-Thompson Elec. Co.
General Electric Co.
Rome Wire Co.
Westinghouse E. & M. Co.
Coils, Choke and Kicking
Elec. Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
Coin Counting Machines
Cleveland Fare Box Co.
Intern'l Register Co.
Johnson Fare Box Co.
Coin Sorting Machines
Cleveland Fare Box Co.
Coin Wrappers
Cleveland Fare Box Co.
Commutator Slotters
Elec. Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
Commutator Truing Devices
General Electric Co.
Commutators or Parts
Cameron Elec'l Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Mica Insulator Co.
Westinghouse E. & M. Co
Compounds—Insulating and Splicing
Johns-Manville Co.
Compressors, Air
General Electric Co.
Ingersoll-Rand Co.
Western Electric Co.
Westinghouse Tr. Br. Co.
Compressors, Air Portable
Ingersoll-Rand Co.
Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
Condensor Papers
Irvington Varnish & Ins. Co.
Connectors, Solderless
Dossert & Co.
Westinghouse E. & M. Co.
Connectors, Trailer Car
Consolidated Car Heating Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Controllers or Parts
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse E. & M. Co.
Controller Regulators
Elec. Service Sup. Co.
Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.
Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
Conveying and Hoisting Machinery
Columbia M. W. & M. I. Co.
Copper Wire
Anaconda Copper Mining Co.
Rome Wire Co.
Cord Adjusters
National Vulcanized Fibre Co.
Cord, Bell, Trolley, Register,
Brill Co., The J. G.
Elec. Service Sup. Co.
Internat'l Register Co., The
Roebling's Sons Co., John A.
St. Louis Car Co.
Samson Cordage Works
Silver Lake Co.
Cord Connectors and Couplers
Elec. Service Sup. Co.
Samson Cordage Works
Wood Co., Chas. N.
Cord, Trolley
Trolley Supply Co.
Couplers, Car
Brill Co., The J. G.
Gould Coupler Co.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.
Cranes
Allis-Chalmers Mfg. Co.
Cross Arms (See Brackets)
Crossing Foundations
International Steel Tie Co.
Crossings
Ramapo Ajax Corp.
Crossing Signals (See Signals, Crossing)
Crossing, Frog & Switch
Wharton, Jr., & Co., Wm.
Ramapo Ajax Corp.
Crossing Manganese
Ramapo Ajax Corp.
Crossings, Track (See Track, Special Work)
Crossings, Trolley
Ohio Brass Co.
Curtains and Curtain Fixtures
Brill Co., The J. G.
Edwards Co., Inc., The O. M.
Elec. Service Sup. Co.
Morton Mfg. Co.
St. Louis Car Co.
Cut-Outs
Johns-Pratt Co.
Dealer's Machinery
Elec. Equipment Co.
Foster Co., H. M.
Derailing Devices (See also Track Work)
Wharton, Jr., & Co., Wm.
Derailing Swiches, Tee Rail
Ramapo Ajax Corp.
Detective Service
Wish-Service, P. Edward
Doors & Door Fixtures
Edwards Co., Inc., The O. M.
Hale & Kilburn Corp.
St. Louis Car Co.
Door Operating Devices
Brill Co., The J. G.
Consolidated Car Heati'g Co
General Electric Co.
Nat'l Pneumatic Co., Inc.
Safety Car Devices
Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
Drills, Rock
Ingersoll-Rand Co.
Drills, Track
Amer. Steel & Wire Co.
Elec. Service Sup. Co.
Ingersoll-Rand Co.
Ohio Brass Co.
Dryers, Sand
Elec. Service Sup. Co.
Ears
Ohio Brass Co.
Ebony Asbestos Wood
Johns-Manville Co.
Electrical Wires and Cables
Amer. Electrical Works
Roebling's Sons & Co., J. A.
Rome Wire Co.
Western Electric Co.
Electric Grinders
Railway Track-Work Co.
Seymour Rail Grinder Co.
Electric Locomotives
St. Louis Car Co.
Electrodes, Carbon
Railway Track-Work Co.
Electrodes, Steel
Railway Track-Work Co.
Enamels
Beckwith-Chandler Co.
Engineers, Consulting, Contracting and Operating
Allison & Co., J. S.
Archbold-Brady Co.
Arnold Co., The
Beeler, John A.
Bibbins, J. Rowland
Day & Zimmerman, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Ong, Joe R.
Richey, Albert S.
Robinson & Co., Dwight P.
Sanderson & Porter
Stevens & Wood, Inc.
Stone & Webster
White Eng. Corp., The J. G.
Wortham, Edwin
Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
Extension Platform Trap-doors
Edwards Co., Inc., The O. M.
Fare Boxes
Cleveland Fare Box Co.
Economy Electric Devices
Johnson Fare Box Co.
Nat'l Ry. Appliance Co.
Fences, Woven Wire and Fence Posts
Amer. Steel & Wire Co.
Fenders and Wheel Guards
Brill Co., The J. G.
Consolidated Car Fender Co.
Elec. Service Sup. Co.
Root Spring Scraper Co.
St. Louis Car Co.
Star Brass Works
Trolley Supply Co.
Fibre and Fibre Tubing
Johns-Manville Co.
Westinghouse E. & M. Co.
Field Coils (See Coils)
Fire Extinguishers
Johns-Manville Co.
Flangeway Guards, Steel
Godwin Co., Inc., W. S.
Flaxlinum Insulation
Nat'l Ry. Appliance Co.
Floodlights
Elec. Service Sup. Co.
Flooring Composition
Johns-Manville Co.
Forgings
Carnegie Steel Co.
Columbia M. W. & M. I. Co.
Standard Steel Works
Frogs & Crossings, Tee Rail
Ramapo Ajax Corp.
Frogs, Track (See Track Work)
Frogs, Trolley
Ohio Brass Co.
Funnel Castings
Wharton, Jr., Inc., & Co., Wm.
Furnace, Electric
Pittsburgh Elec. Furnace Corp.
Furniture, Metal Office
Edwards Co., Inc., The O. M.
Fuses, Cartridge, Non-Refillable
Johns-Pratt Co.
Fuses and Fuse Boxes
Columbia M. W. & M. I. Co.
Consolidated Car Heati'g Co
General Electric Co.
Western Electric Co.
Westinghouse E. & M. Co.
Fuses, Cartridge, Refillable
Johns-Pratt Co.
Fuses, High Voltage
Johns-Pratt Co.
Fuses, Refillable
Columbia M. W. & M. I. Co.
General Electric Co.
Gaskets
Johns-Manville Co.
Power Speciality Co.
Westinghouse Tr. Br. Co.
Gas-Electric Cars
General Electric Co.
Gasoline Torches
Economy Elect. Devices Co.
Gas Producers
Westinghouse E. & M. Co.
Gates, Car
Brill Co., The J. G.
St. Louis Car Co.
Gear Blanks
Carnegie Steel Co.
Standard Steel Works
Gear Cases
Chillingworth Mfg. Co.
Columbia M. W. & M. I. Co.
Elec. Service Sup. Co.
Westinghouse E. & M. Co.
Gears and Pinions
Ackley Brake & Supply Corp.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Elec. Service Sup. Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.
Generating Sets, Gas-Electric
General Electric Co.
Generators
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse E. & M. Co.
Girder Rails
Lorain Steel Co.
Gong (See Bells and Gongs)
Greases (See Lubricants)
Grinders and Grind. Supplies
Metal & Thermit Corp.
Railway Track-work Co.
Grinders, Portable
Railway Track-Work Co.
Grinders, Portable Electric
Railway Track-Work Co.
Seymour Rail Grinder Co.
Grinding Blocks and Wheels
Railway Track-work Co.
Guard Rail Clamps
Ramapo Ajax Corp.
Guard Rails, Tee Rail & Manganese
Ramapo Ajax Corp.
Guards, Cattle
American Bridge Co.
Guards, Trolley
Elec. Service Sup. Co.
Ohio Brass Co.
Hammers Pneumatic
Ingersoll-Rand Co.
Hand Holds
Central Equipment Co.

Pneumatic
Tie Tampers and Car



Pneumatic Methods Reduce Costs

A pneumatic tie tamping outfit makes possible the use of labor-saving methods for other work besides tamping ballast under the ties.

For instance, as shown above, the tamping tools have been fitted with cutting tools and used for breaking up the concrete base before making repairs to the track. Other air tools such as Paving Breakers, Track Drills, Grinders, etc., are also used with the outfit.

Ask for literature describing the many uses of Tie Tamper Outfits in track work.

Ingersoll-Rand Company
11 Broadway, New York

For Canada refer
Canadian Ingersoll-Rand Co., Limited
260 St. James St., Montreal

Ingersoll-Rand

Harps, Trolley
Anderson Mfg. Co., A. & J. M.
Bayonet Trolley Harp Co.
Elec. Service Sup. Co.
Nuttall Co., R. D.
Star Brass Works
Thornton Trolley Wheel Co.
Western Electric Co.
Headlights
Elec. Service Sup. Co
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.
Trolley Supply Co.
Heaters, Car (Electric)
Consolidated Car Heat'g Co.
Economy Electric Devices
Gold Car Heat. & Light. Co
Nat'l Ry. Appliance Co., P.
Smith Heater Co., Peter
Helmets—Welding
Railway Track-Work Co.
Heaters, Car, Hot Air and Water
Elec. Service Sup. Co.
Smith Heater Co., Peter
Hoists and Lifts
Columbia M. W. & M. I. Co.
Ford Chain Block Co.
Hoists, Portable
Ingersoll-Rand Co.
Hydraulic Machinery
Allis-Chalmers Mfg. Co.
Industrial Co-ordination
Sherman Service, Inc.
Industrial Flooring
Johns-Manville Co.
Instruments Measuring, Testing and Recording
Economy Elect. Devices Co.
Elec. Service Sup. Co.
General Electric Co.
Roller-Smith Co.
Western Electric Co.
Westinghouse E. & M. Co.
Insulating Cloth, Paper and Tape
General Electric Co.
Irvington Varnish & Ins. Co.
Johns-Manville Co.
Mica Insulator Co.
National Vulcanized Fibre Co.
Okonite Co.
Stand. Underground Cable Co.
Westinghouse E. & M. Co.
Insulating Silk
Irvington Varnish & Ins. Co.
Insulating Varnishes
Irvington Varnish & Ins. Co.
Insulation (See also Paints)
Anderson, M. Co., A. & J. M.
Electric Ry. Equiptmt. Co.
Electric Service Sup. Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Johns-Manville Co.
Mica Insulator Co.
Okonite Co.
Westinghouse E. & M. Co.
Insulators (see also Line Material)
Anderson, M. Co., A. & J. M.
Drew Elec. & Mfg. Co.
Electric Ry. Equipmt. Co.
Electric Service Sup. Co.
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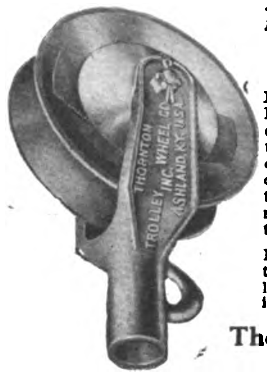

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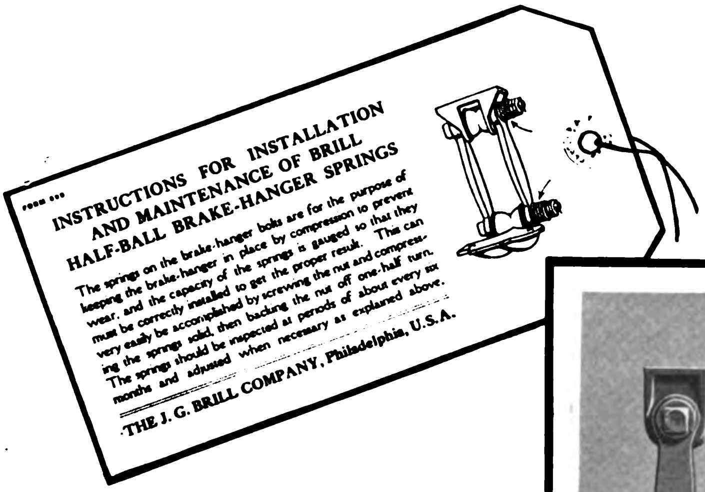
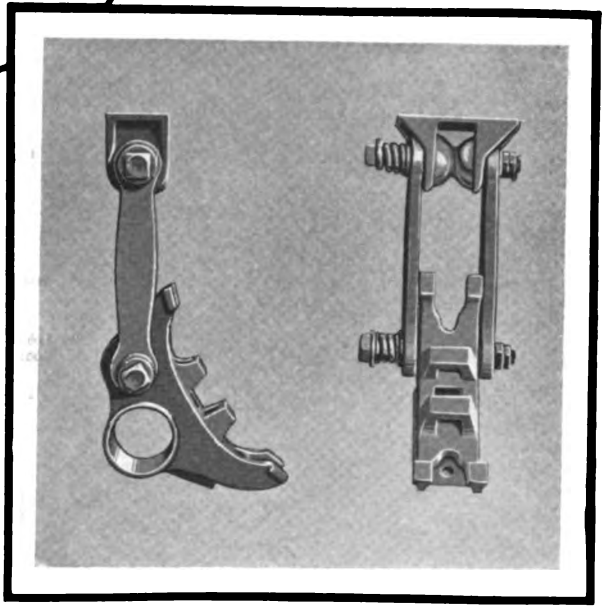


INSTRUCTIONS FOR INSTALLATION AND MAINTENANCE OF BRILL HALF-BALL BRAKE-HANGER SPRINGS

The springs on the brake-hanger bolts are for the purpose of keeping the brake-hanger in place by compression to prevent wear, and the capacity of the springs is gauged so that they must be correctly installed to get the proper result. This can very easily be accomplished by screwing the nut and compressing the springs solid, then backing the nut off one-half turn. The springs should be inspected at periods of about every six months and adjusted when necessary as explained above.

THE J. G. BRILL COMPANY, Philadelphia, U.S.A.



Brill "Half-Ball" Brake Hanger

Adjustment

Many years have passed since the Brill "Half-Ball" Brake Hanger made its appearance on all types of Brill trucks. And since that time it has constantly been giving the efficient service for which it was developed—eliminating the jolt and rattle from brake operation, keeping the brake shoes in proper alignment and thereby saving maintenance expense by reducing uneven shoe wear. The Brill "Half-Ball" Brake Hanger is not only noiseless, but is also self-adjusting to wear and self-cleaning.

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AMERICAN CAR CO. — G. C. KUHLMAN CAR CO. — WASON MANF'G CO.
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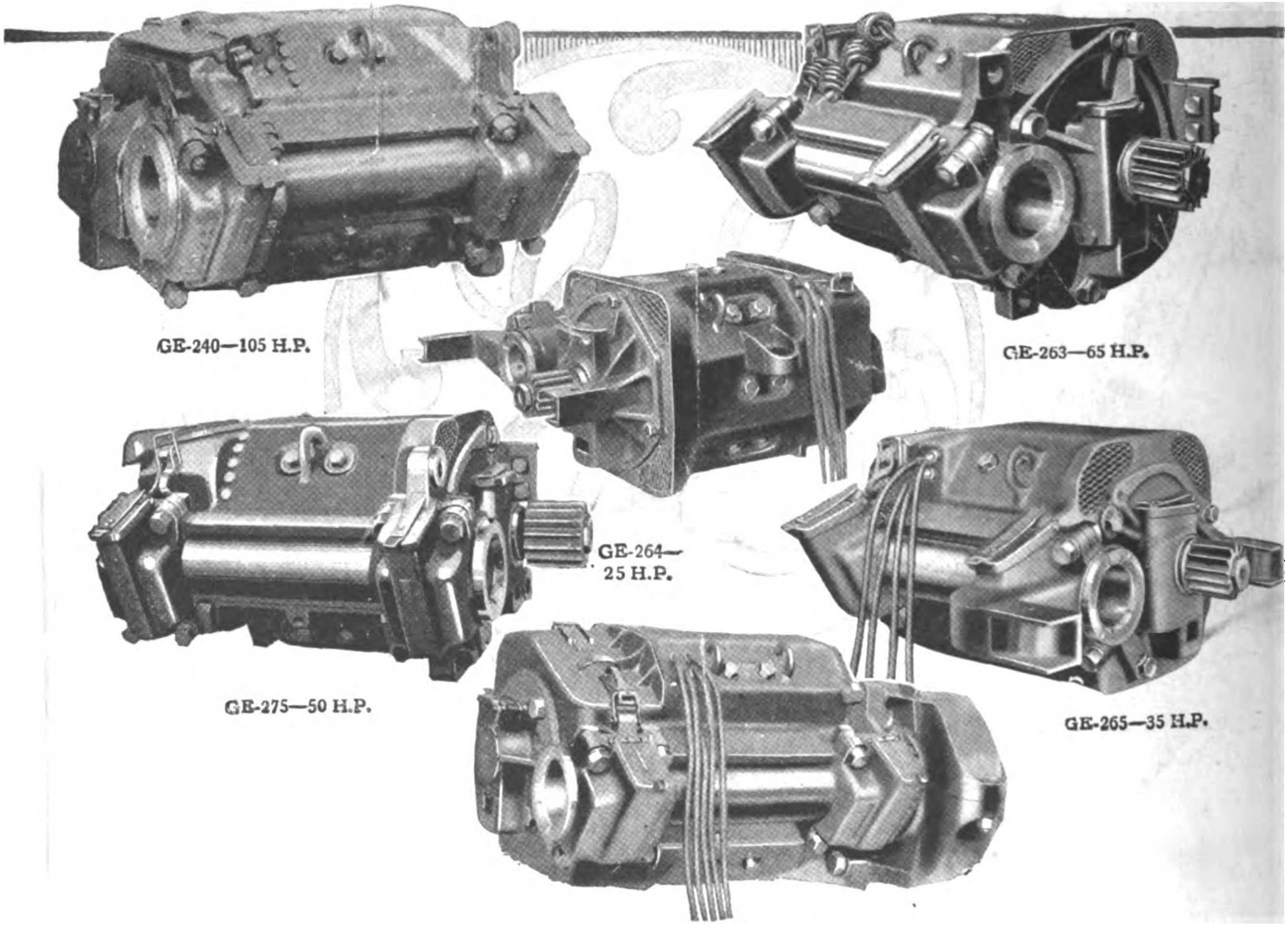
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GE-263—65 H.P.
GE-264—25 H.P.
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—and service is improved

Records of a large number of railway motors which have been in service 15 to 20 years show annual maintenance and inspection costs of $120 to $250 per motor.

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Investigate the savings in operating costs, and the increased reliability of service which can be obtained by replacing your older machines.

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Electric Railways*

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The Bindery

WE'RE in the bindery now, completely fascinated by the uncanny skill and accuracy of the marvelous gathering machine as it assembles, stitches and puts covers on the current issue of the JOURNAL. All that the gathering machine asks is that some one be kind enough to place before it, in proper sequence, the stacks of printed sections, or "signatures," that make up a publication, and then go away and let it complete the whole job. And it completes it, too, so perfectly and smoothly that you find yourself indulging in a sneaking hope that the machine will be human enough to assemble a few sections in wrong order or leave out a section entirely. But this superhuman machine cannot make mistakes! Metal hands pick out the proper sections and drop them on top of other sections of that issue traveling by on a metal carrier. By the time these signatures reach the end of the carrier, complete publications, all but the covers, go forward, one at a time. Now tilted upright and moving in a groove they are stitched with wire; and in another moment the lower edge lightly brushes the top of a huge pot of churning glue. Still moving onward the paper meets and attaches itself to the cover which seems to happen along from somewhere at just the right moment. The completed publication then drops off this remarkable machine.

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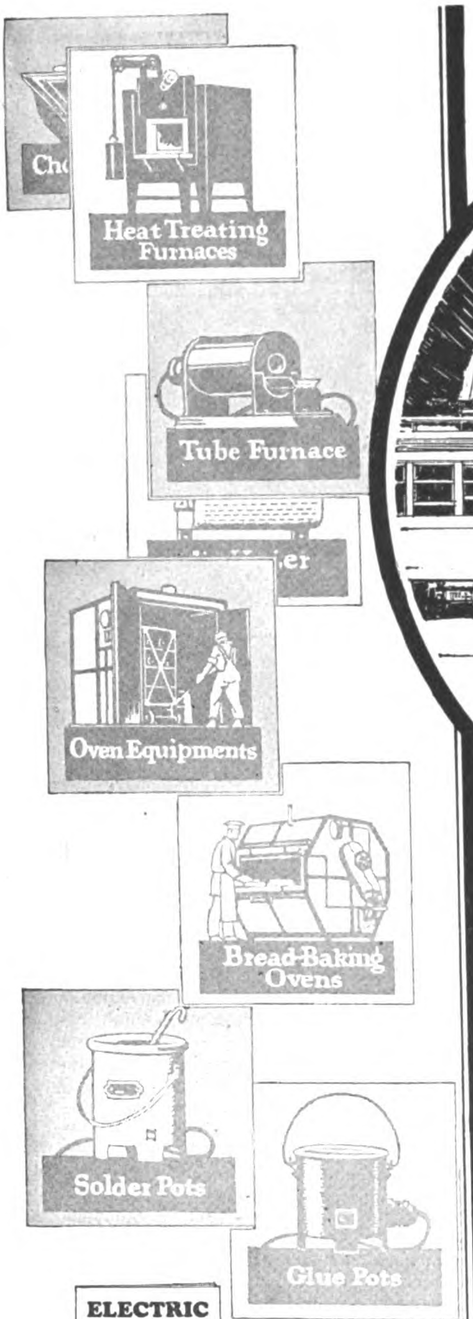
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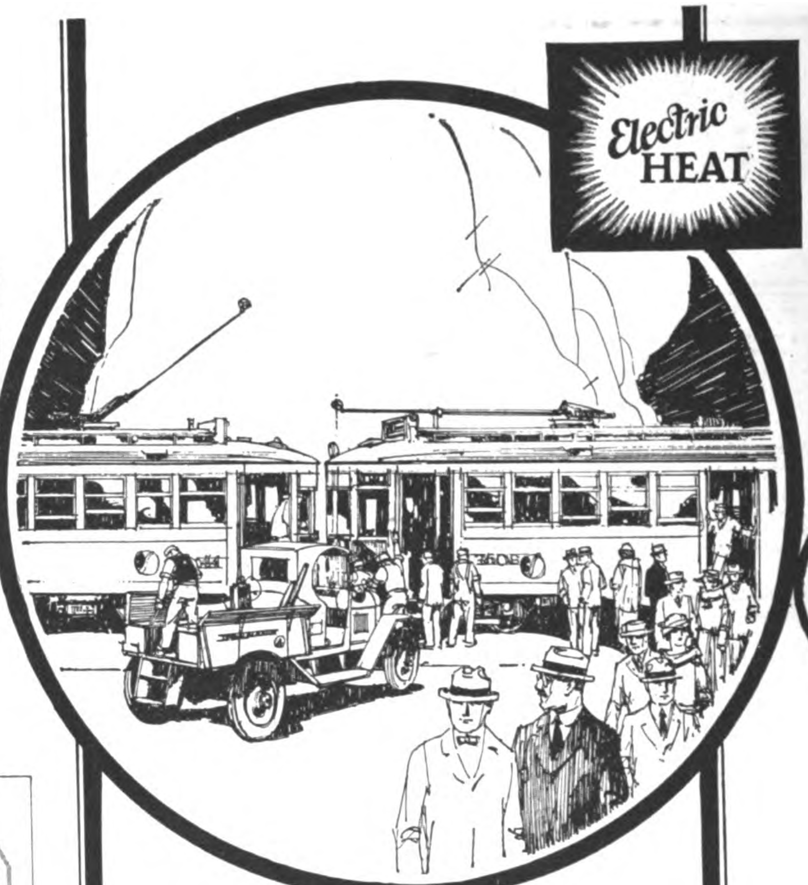
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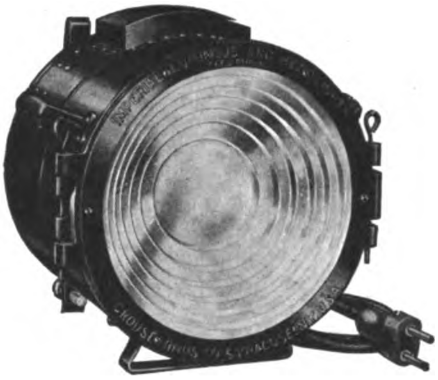

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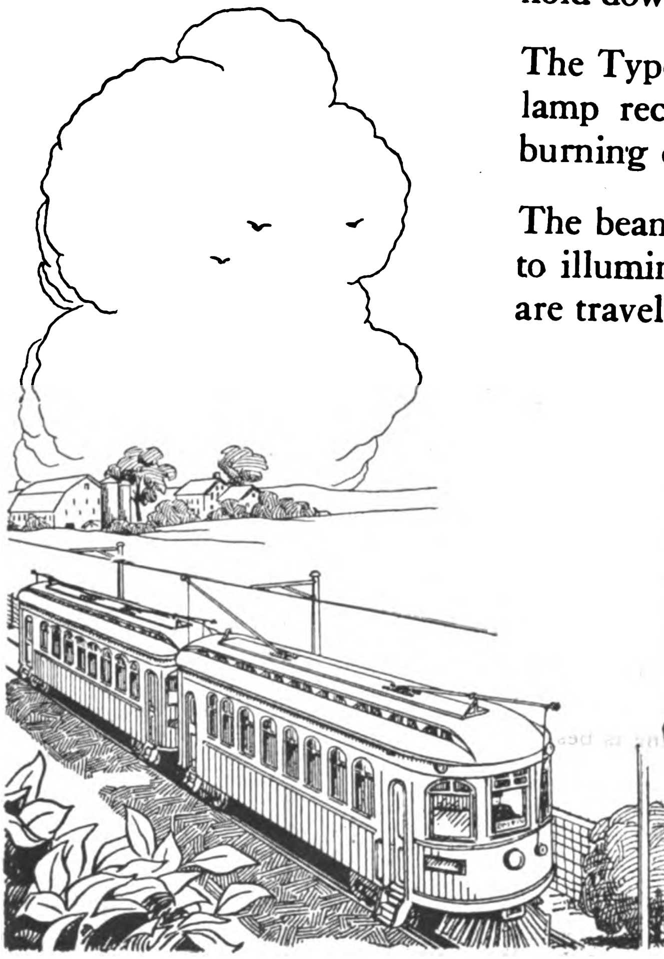
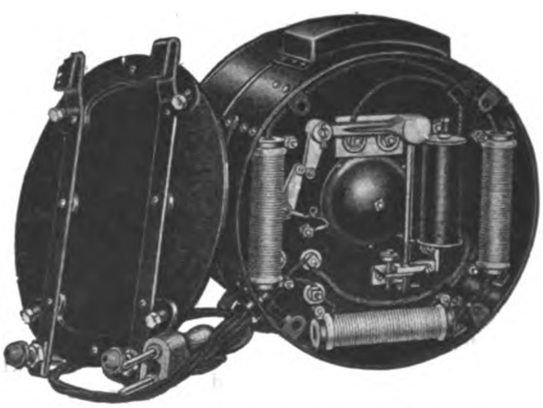
This is the Headlight for High Speed Work where Voltage is not Constant

The luminous arc in this Crouse-Hinds Imperial Headlight is maintained through a very considerable fluctuation in voltage. It will operate under very adverse voltage conditions, since the arc will hold down to fifty percent of normal or even lower.

The Type LAA is provided with two incandescent lamp receptacles and the necessary resistance for burning on city streets and in terminals.

The beam from this headlight is powerful enough to illuminate the track for safe braking when cars are travelling sixty miles an hour.





This rear view, with cover removed, indicates how the arc mechanism is entirely partitioned off from the arc compartment. None of the arc fumes can possibly reach the mechanism.

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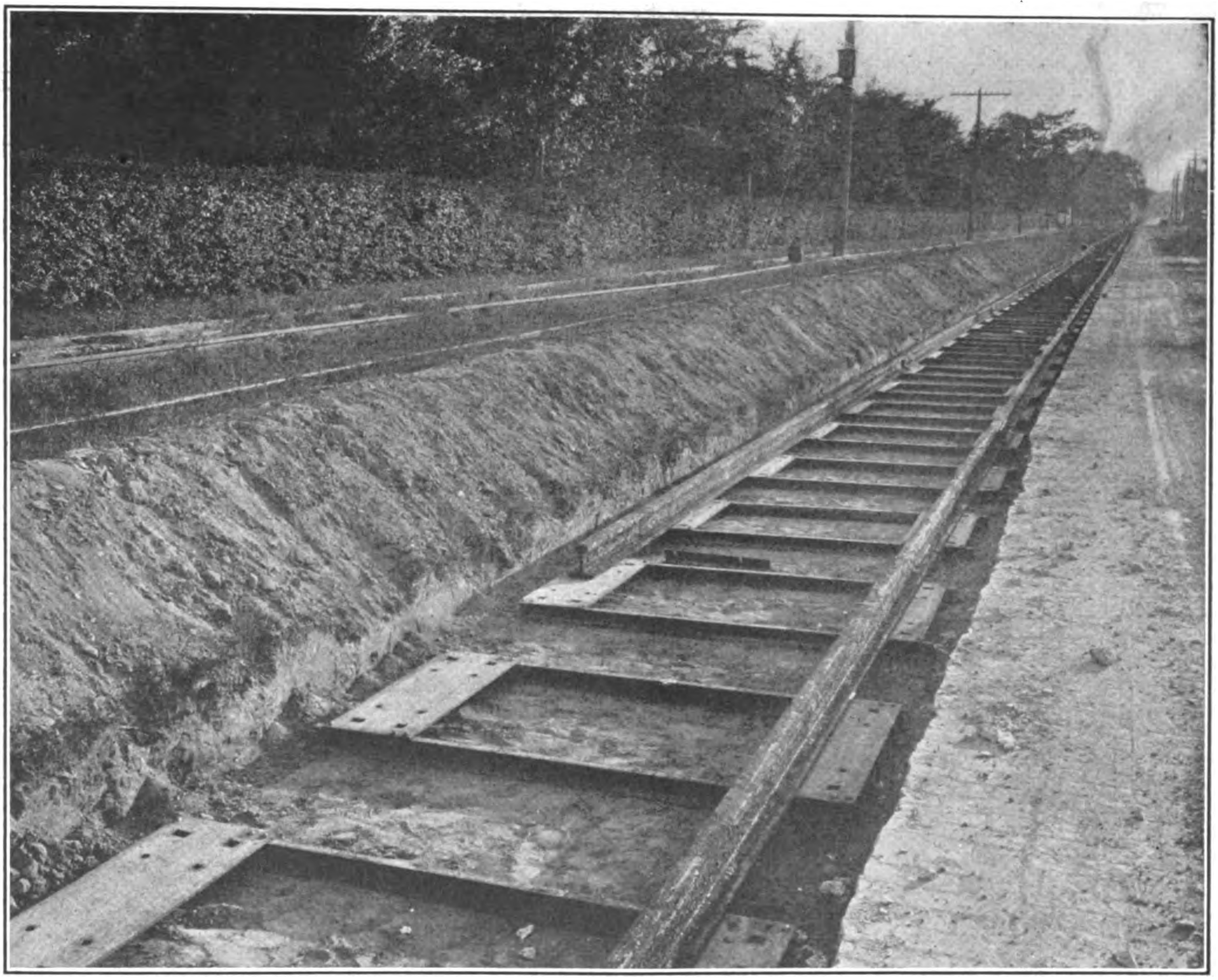

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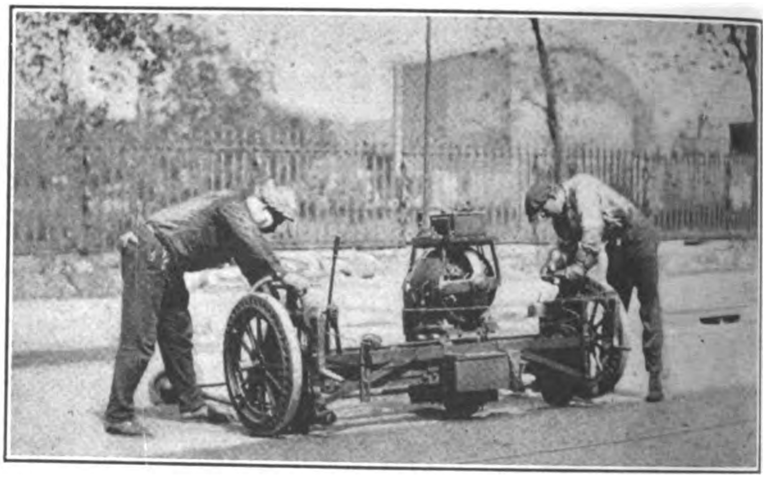
THE INTERNATIONAL STEEL TIE CO.
Cleveland, Ohio

Steel Twin Tie Track

"UNIVERSAL" Rotary Track Grinder



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Outboard bearing on grinding wheel arbor gives firm support to the rapidly rotating wheel.

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Large rubber-tired derail wheels,—can be drawn behind a truck to the job.

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Capacity—333 amps. at 600 volts.
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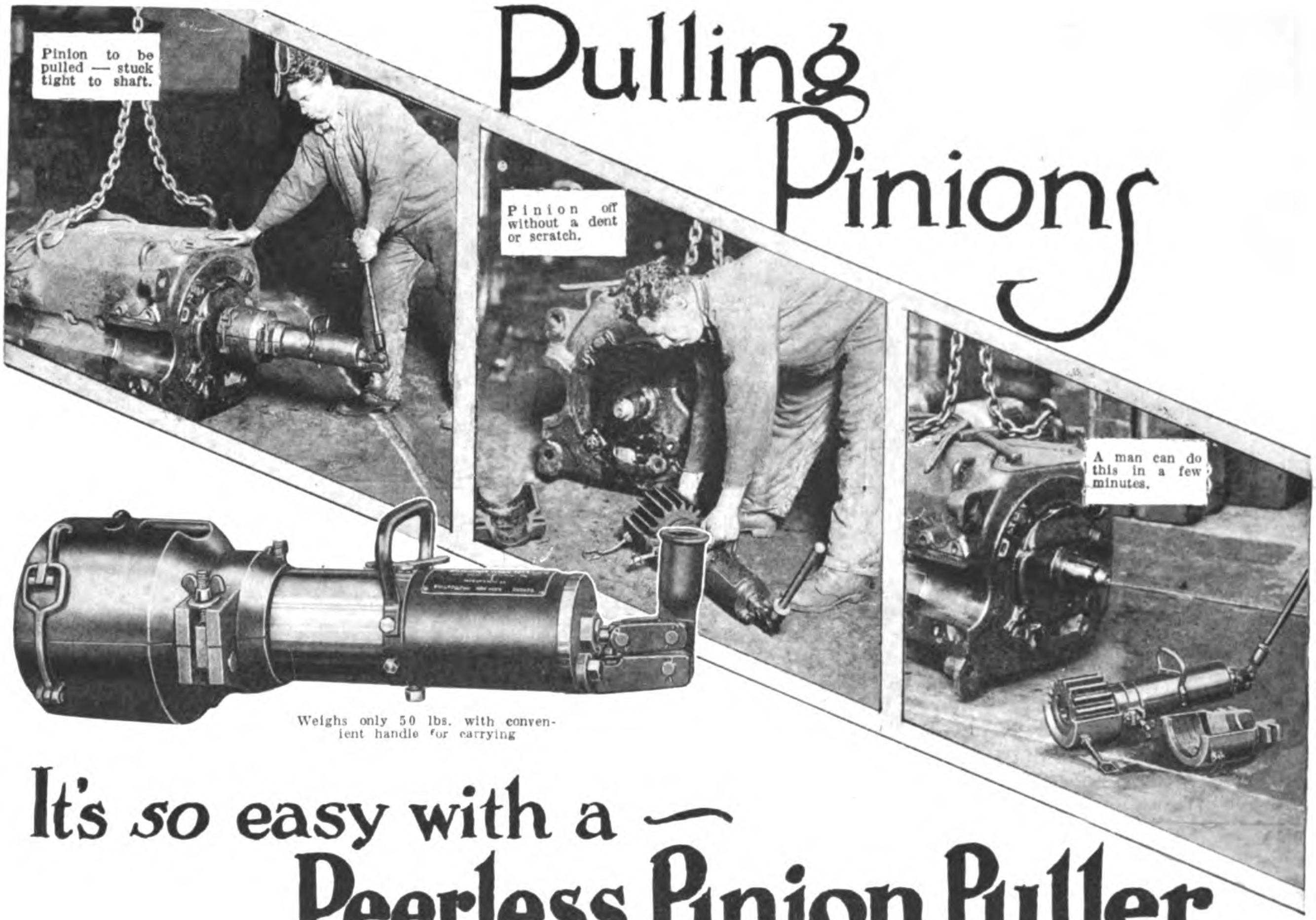
Pinion to be pulled — stuck tight to shaft.
Pinion off without a dent or scratch.
A man can do this in a few minutes.

Weighs only 50 lbs. with convenient handle for carrying

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A portable, hydraulic equipment, which *one man* can handle and operate. The jaws clamp over the pinion and a few strokes on the handle will suffice to do the job. Amply powerful to pull the most refractory pinion without danger of breakage.

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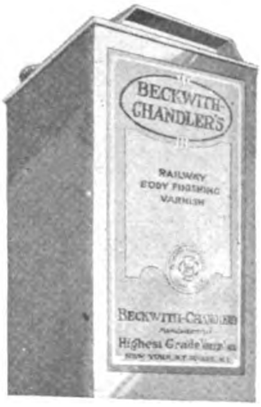
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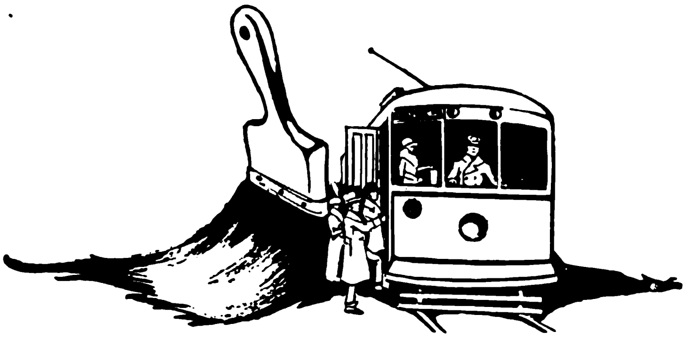

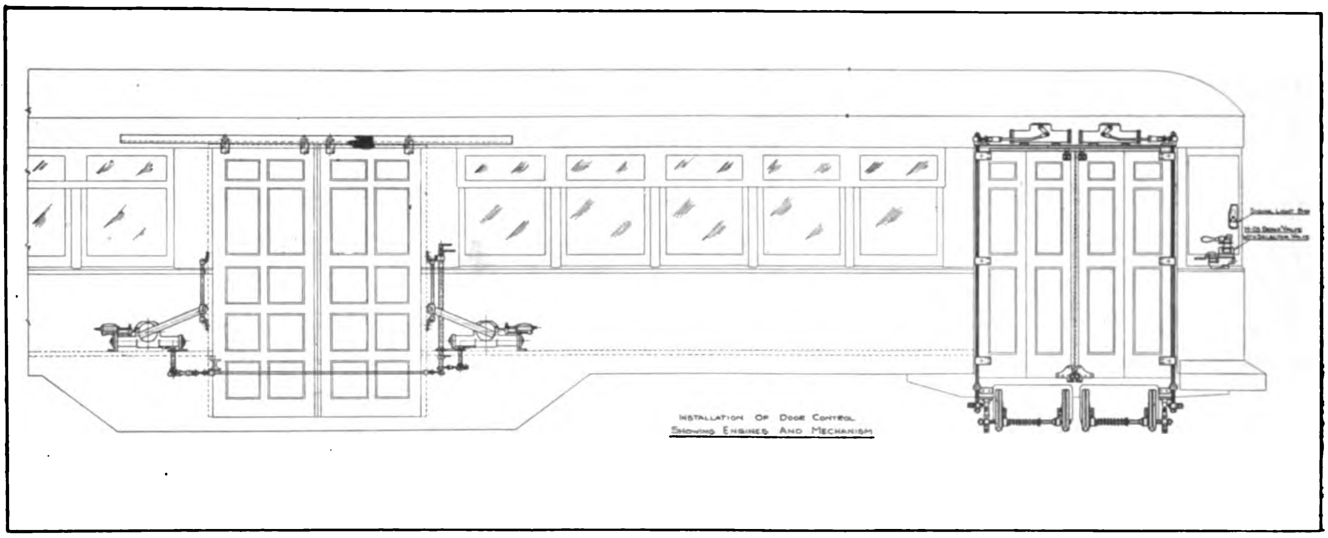

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Door and Step Operating Mechanisms
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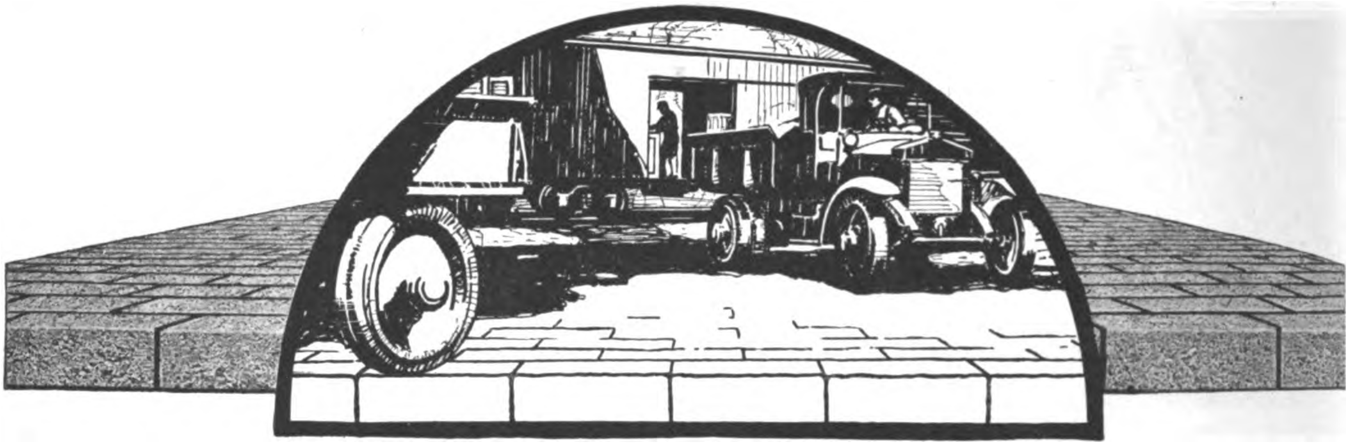

The pound-pound-pound of traffic

THE crash and jolt of heavy truck wheels over your tracks play quick havoc with the paving between them unless it is tough yet elastic.

Vitrified brick, asphalt filled, is the one surfacing material which withstands impact, water-seals your road bed, and is easily removable for track repairs at so reasonable a cost.

And the annual upkeep is least through its long years of service.

Suitable specifications on request.

NATIONAL PAVING BRICK
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VITRIFIED
Brick
PAVEMENTS

A New Addition to the Wabco Family!

WABCO Brake Cylinder Gaskets

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All those interested in Air Brake maintenance are familiar with the matchless efficiency and economy of Wabco Cups.

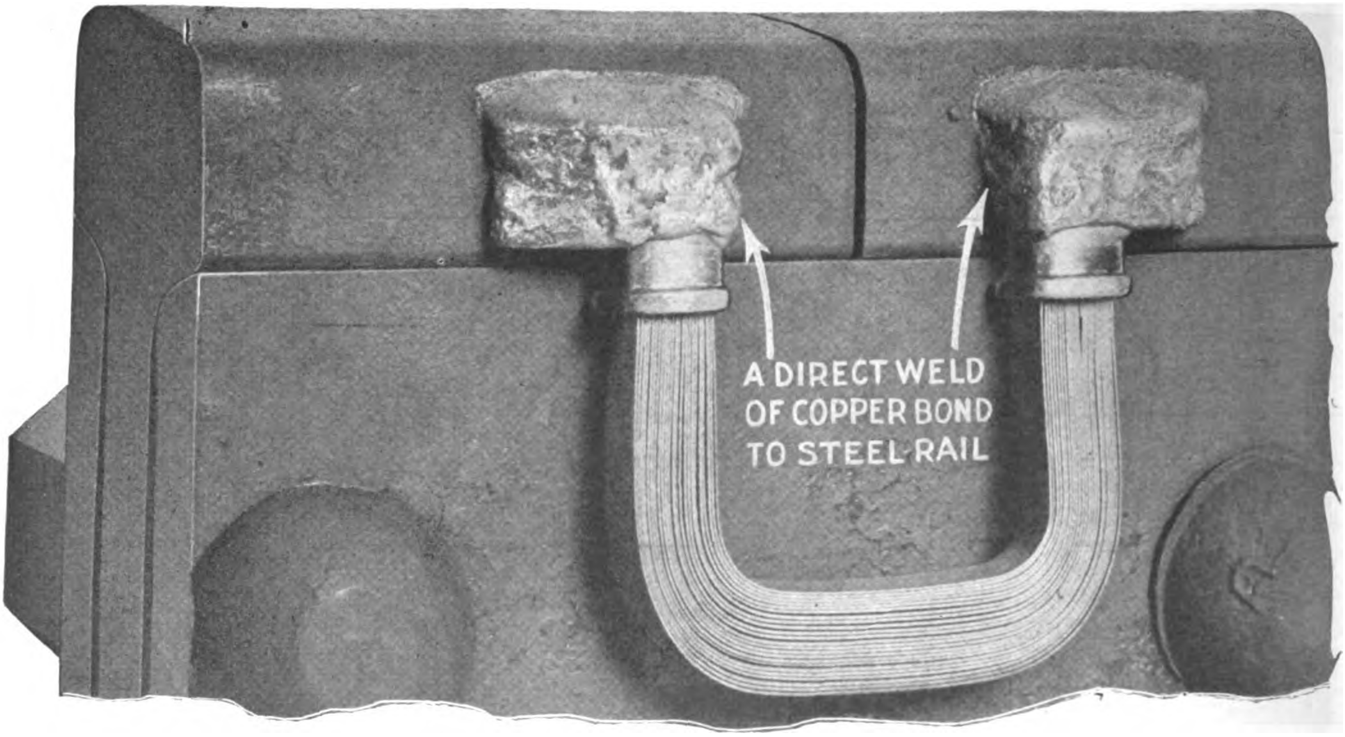
Wabco Gaskets will be found to offer the same advantages.

Wabco is the name of a special-processed material and the use of the name on any cup or gasket is a guarantee of superior quality and service.

*"COST LESS BECAUSE
THEY LAST LONGER"*

Westinghouse Traction Brake Company
General Office and Works: Wilmerding, Pa.

WESTINGHOUSE TRACTION BRAKES



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There was real enthusiasm back of that statement recently made by a well-known engineer. His approval of UNA Bonds was based on a careful survey of UNA bonding as it was being done on his property and also on the final results such as power saved and permanence of installation.

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1. UNA Bonds are all copper.
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4. There is great strength in the weld of copper bond to steel rails. Many tests show that it requires 25,000 to 32,000 pounds steady force to shear even one head from the rail. This accounts for their permanence.
5. The path for the current from rail to rail is copper throughout. Thus power savings are a maximum and the full value of bonding is realized.
6. The initial cost of UNA Bonds installed is low.

Specify UNA Bonds on your next order

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-OILS-

A straight line

is the shortest distance between two points. The installation of Galena Oils leads immediately to better operating conditions, through increased lubricating efficiency.

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The reduction in expenses through the improved performance in these items alone will convince you of the actual economy of Galena lubrication, without even considering the better service it brings.

A complete line

of Galena lubricants covers every requirement of Electric Railway car or power house equipment. Each product is built specially to suit the type of equipment used.

Galena Oils are not ordinary refinery lubricants. They are made from selected stocks by our own special processes. Over a half century of experience in practical railway lubrication has contributed to their development.

Hundreds of electric properties are now using Galena Lubrication Service. Their uniformly efficient performance in mileage and low upkeep costs is conclusive evidence of its economic value.

Lubricating Efficiency

QUALITY-SERVICE-ECONOMY — GALENA OILS — G S O C

Galena-Signal Oil Company
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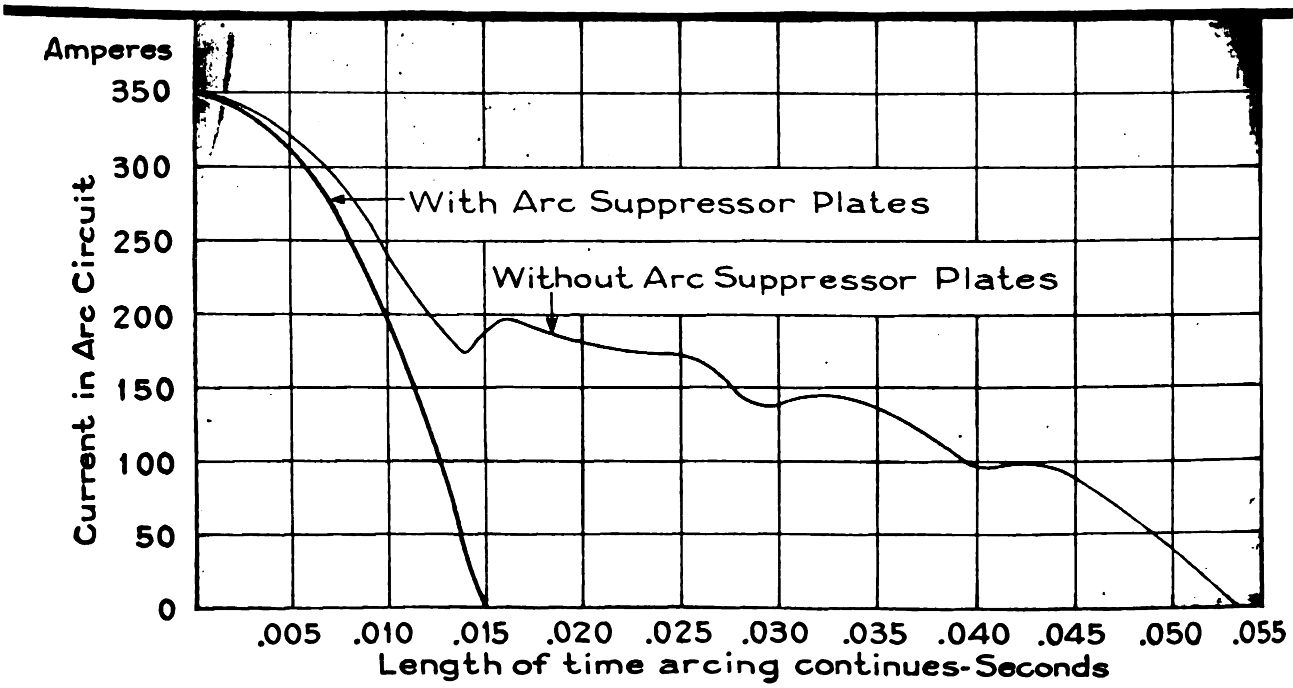
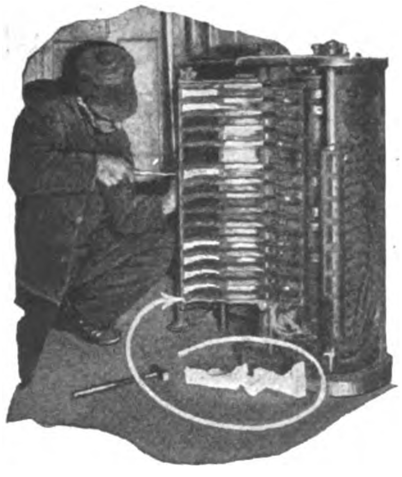
and offices in principal cities

QUALITY-SERVICE-ECONOMY — GALENA OILS — G S O C

What G-E Arc Suppressor Plates Do





G-E Arc Suppressor Plates are installed opposite the fingers where there is the most arcing. They narrow the arc passages, which increases the resistance of the arc and the cooling effect of the plates.

NOTE the difference in time required to disrupt the arc in a K-35 controller as shown by actual test. This difference means there's considerably less burning of controller fingers, segments, and arcing plates when the equipment is protected with G-E Arc Suppressors.

Consider the value of these auxiliary plates in reducing maintenance costs. They reduce carbonization and eliminate much of the trouble from pitting of contacts. Modern controllers are equipped with them to give better, longer service.

Arc Suppressor Plates can be used to advantage in any G-E controller having individual finger blowouts. Installation requires only a few minutes. They are inexpensive. Try them.

General Electric Company
Schenectady, N. Y.
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GENERAL ELECTRIC

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The Cedar Point Convention of the C.E.R.A.

THE climax of the Cedar Point convention of the Central Electric Railway Association last week came in the final session on Friday morning when E. F. Wickwire made his address. His subject was "Co-operation of Manufacturers," but his address was far more comprehensive, for he outlined a plan of united action for the entire electric railway industry, both railways and manufacturers, that is not only practical, but whose consummation would soon have a profound effect in establishing a sympathetic understanding on the part of the public. Such a combination of all the electric railway interests, national, state and community, is not impossible, and in united effort it would represent a force of public opinion that must be reckoned with.

Another valuable suggestion in Mr. Wickwire's address, which is printed on page 138, is his scheme for changing the popular conception of the man who represents the electric railway, by picturing broadcast a pleasant-faced man in overalls. In these days of regulation, if not before, this is a true characterization of "Mr. Electric Railway"—a workingman, giving an honest day's service for a fair living wage. That is all he gets.

While of the usual high order of value and interest, this C.E.R.A. convention was disappointing in one feature. The reports made by the Engineering Council did not show the accomplishment that it seemed fair to expect. The three principal committee reports, published on page 146, were expected to crystallize out of the various round-table discussions of the sectional groups, some very definite recommendations as to best practices and as to standardization. However, very little progress in these directions is discernible, and much of the matter contained in the reports is common knowledge. Of course, the functioning of the Engineering Council is still in the experimental stage, but the results thus far show clearly the need for more definiteness of procedure.

It is unquestionably a fine thing for the track, line, power and equipment men to meet and have these round-table exchanges of experience. But if these meetings are not going to get anywhere, the value of the discussions and the interest will rapidly disappear. Thus far there has been a notable tendency to cover the same old ground in the discussions without bringing out of it some definite conclusion or consensus of opinion.

Perhaps the remedy lies in having some executive, who is an engineer by training and experience, sit in the sectional meetings and act as sponsor, with the duty of bringing the discussions down to definite conclusions. In other words, this would be a plan similar to that now followed with each committee of the national railway associations, which is sponsored by a member of the executive committee of the association. The opportunity to do a most valuable piece of work in standardizing practices and equipment among the many interconnecting interurban systems of the C.E.R.A. territory is so great that it is to be hoped that the matter will be given the study it merits, looking toward a plan that will bring accomplishment.

The Air Brake Is a Vital Auxiliary

THE discussion which has gone on for years regarding the relative merits of different methods of emergency braking led the Central Electric Railway Association to undertake a series of tests, the results of which are described in this week's issue. The committee concludes that while there is no one best way to stop a car in an emergency, it may be said that the best practice for a car equipped with air brakes is to apply emergency air and sand, simultaneously throwing the controller to the off position. While this result is not unexpected by those who have made a serious study of the problem, it serves to refute the statements frequently made that reversal of the motors or dynamic braking is preferable in an emergency, or that a motorman did not do all in his power to stop the car if he did not use electrical braking.

The greatest braking force that can be used on a car is that which will just fail to lock the wheels. With excellent track conditions this results in a retardation somewhere in the neighborhood of 4.5 to 5 m.p.h. per second. In the tests, especially those on the Birney car, this figure was very closely approached.

It is significant that in general the average rate of retardation secured was greater with emergency application of air than with the electrical methods. Probably a considerable amount of this was due to the psychological factor, the men being trained so that almost by instinct power is thrown off and the emergency air applied when danger occurs.

One of the great difficulties with the electrical method of braking is that if sufficient force is used to make a rapid stop there is danger of a closely set circuit breaker blowing out, which of course removes all the braking force and allows the car to move without restriction. Both this and dynamic braking, in which the motors are used as generators, place severe strains on the electrical equipment, and sometimes results in burned out windings or connections serving to remove the braking effort. In the test, as is to be expected, these methods, were found more erratic than air.

The real value of electrical methods of braking is in case anything happens to the air brakes so that they are inoperative. It is, of course, comforting to know that an auxiliary brake exists which can be called on in such cases, even though it is not as efficient as the regular air brake. For this reason it is well not to be-little this form of braking, though the air should be relied on as long as it is in working condition.

Since these tests were made very largely for use in court cases, in which the distance to stop a car is called into question, particular attention should be paid to the fact that the rail conditions under which they were made were better than those frequently obtained on busy streets. The rails were either clean and dry or else thoroughly wet, both of which conditions make for a shorter stopping distance than when a thin film of moisture or vegetation or a light fall of snow is on the rail head. For this reason the results of the tests should be regarded as minimum distances, rather than the average or maximum, in which a car can be stopped. Under commonly met conditions the distance a car will travel after the brakes are applied is considerably more than those recorded in the tests.

Zoning Laws Aid Transit Operation

ONE of the most serious problems in our large cities today is that of traffic congestion. Electric railways are hampered not only by the vehicular congestion in the streets but also by extreme concentration of traffic on their own lines in certain localities. Usually such troubles are the result of imperfections in the original layout of the city. After congestion has developed it is too late to make over the street plan. Zoning laws, however, are being recognized as an extremely useful method of localizing the evils of imperfect planning and preventing their recurrence in new places.

Zoning laws should have the hearty indorsement of the electric railway industry. They make possible a reasonable forecast concerning the future development of various sections of the community. They permit the railway to plan today to meet to-morrow's needs. They prevent sudden and unexpected changes in the character of service demanded by a particular locality.

If zoning is done in time the various streets are used in the way for which they were laid out. By establishing permanently the character of different sections of the city, narrow streets designed for light traffic are prevented from being choked with the greater volume of traffic which might accompany the change from a residential to a commercial neighborhood.

Changes Needed in Rules for Formulating Standards

THE efforts of the American Electric Railway Engineering Association are constantly directed toward standardization. The work is assuming larger proportions through the activities of the association in connection with its status as a member body of the American Engineering Standards Committee. There must soon be a distinct change in the work of the association in regard to its methods of creating standards because the A.E.S.C. rules of procedure must now be followed if national standardization is desired.

The A.E.S.C. has decided that no subject matter may be presented for standardization after Jan. 1, 1924, under Rule 4, which permits the submission of matter already adopted by the member bodies or in process up to Jan. 1, 1920. After Jan 1, 1924, it will be necessary to request the formation of sectional committees in the A.E.S.C. to secure the broad degree of standardization which A.E.S.C. approval gives.

To the Engineering Association this means that any standard which involves manufacturers and other associations and interests as possible users can no longer be assigned to some standing committee for sole preparation. Standing committees henceforth will probably assume the nature of advisory committees which will function by collecting data and conferring with the association representatives on the several A.E.S.C. sectional committees.

Just how to co-ordinate this work on the new lines will require careful study, in order that initiative may not be stifled, that accuracy may be maintained and that the required actions may be speeded up. The present routine of assignment of subjects by the executive committee to standing committees; study and final report of the standing committees; reference to and study by the committee on standards; reports to convention by both standing and standards committees; and convention debate and action, altogether requires from one to three or more years. It is clearly impracticable to hold to all of this procedure if ever the subjects in hand are to get to and through the A.E.S.C. sectional committee grist mill.

Other member bodies of the A.E.S.C. are, no doubt, facing the same problem. An inquiry as to how they are trying to meet it might serve to guide in the formulation of new rules of procedure within the Engineering Association.

Politics Versus Efficiency

THE summary dismissal of a prominent and experienced engineer from his position as head of the United States Reclamation Service and the appointment in his stead of a combination grocer, banker and politician is an occurrence which technical men view with dismay and indignation. To turn out of office, after thirty years of faithful government service, such a man as Arthur P. Davis, a past-president of the American Society of Civil Engineers, would be regrettable enough at best, but the manner in which it was accomplished and the strange qualifications possessed by his successor throw an even darker cloud over the whole affair.

The position of director of the Reclamation Service was protected by the civil service law. In order to effect this change it was necessary to abolish the position which Mr. Davis held and to create an entirely new position. This in itself was a gross violation of the spirit of the law, if not of its letter.

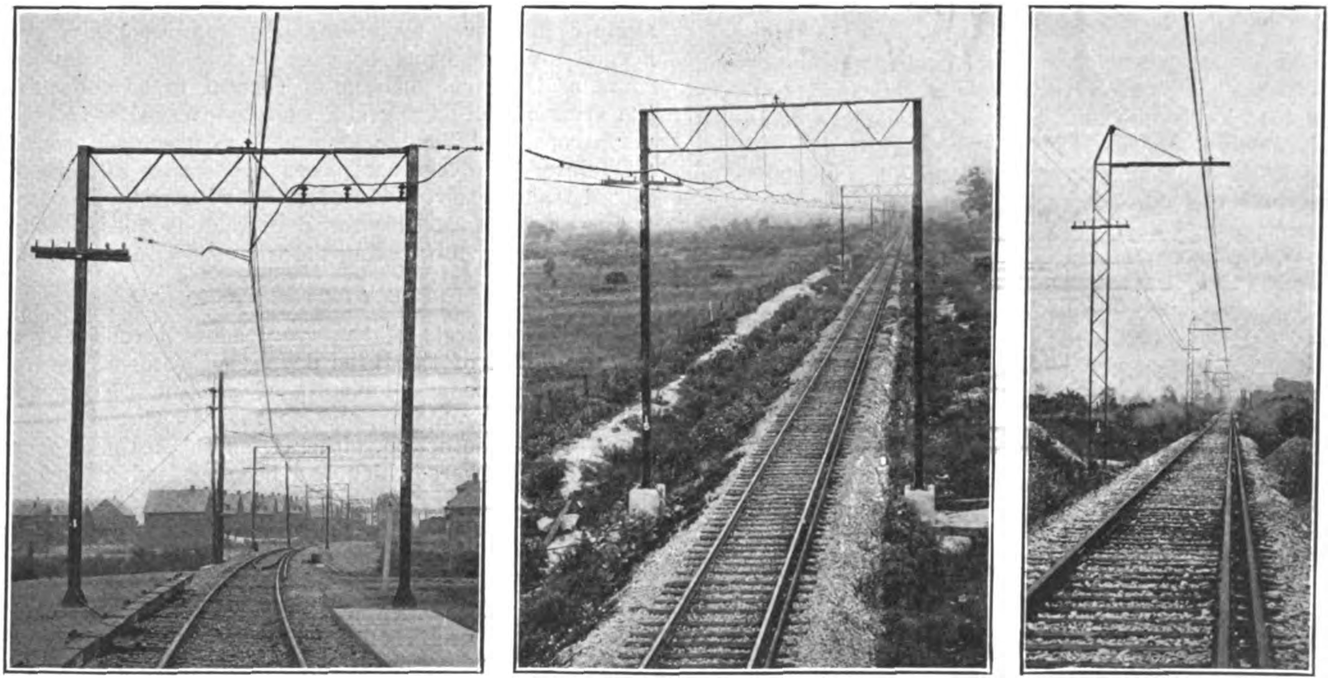
The arguments presented in favor of a business man, rather than an engineer, for the head of this service are wholly specious. Efficient direction is what is needed in the government service, rather than salesmanship or a shrewd ability to juggle profits and losses. For such work an administrator is wanted more than a so-called business man. The engineer who possesses the happy faculty of handling men as well as broad technical knowledge makes an ideal administrator. Proof of this may be found in the increasing number of engineers selected to fill administrative positions.

In no other field is this more true than in the railway industry. Railway men will surely sympathize therefore with the efforts of the American Society of Civil Engineers and the Federated American Engineering Societies to have the whole situation thoroughly investigated. Every detail of this unpleasant affair should be brought out into full daylight.

Collecting 5,400 Amp. at 58 M.P.H.

In Recent Tests at Erie a New Form of Overhead Trolley Suspension Is Tried—With a Pantograph Collector Large Amounts of Current Are Drawn Without Difficulty—New Type Is a Modification of the Usual Catenary Construction

TO SECURE information as to the amount of current that can be collected successfully from an overhead trolley wire, the General Electric Company has been carrying on an elaborate series of tests on its experimental track at Erie, Pa. The construction work involved the erection and test of various types of contact wires and suspension, culminating in the selection of the compound catenary with a so-called laced suspension of the contact wire. A public demonstration and test of this latter type was held July 16, 17 and 18, as described in this paper in the issue of July 21. The present article describes in more detail the engineering features of the installation.



Left, Curve Construction, Supported from Lattice Column Bridges. Center, Tangent Construction Supported from Solid Column Bridges. Right, Latticed Side Bracket Construction on Tangent

For the successful collection of current from an overhead wire it is essential that the contact or contacts between the working conductor and the collector be maintained at all times. Any irregularity in the contact that may cause visible arcing must be avoided. Arcing is a much greater factor in the deterioration of the contact wire than is mechanical wear due to the sliding friction. The aim in designing the overhead construction has been to comply with this essential, and the demonstration has shown the possibility of collecting sufficient current to handle the heaviest trains, even at moderate contact-line voltages.

TEST TRACK DESIGNED FOR HIGH SPEED

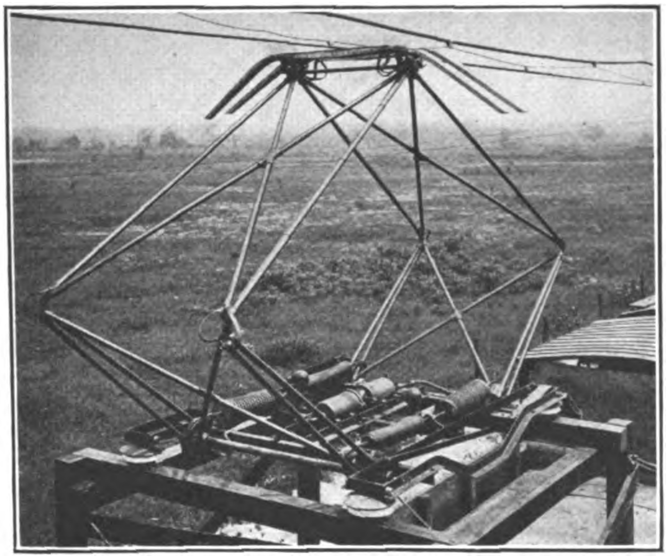
For testing locomotives the General Electric Company makes use of the eastern division of the East Erie Commercial Railroad, a subsidiary. That portion of the track which is used for testing purposes is at present 2¾ miles in length, while an extension now under construction will give a total length of 4¼ miles. The portion used for high-speed running is about 2½ miles long, the remainder being required for slowing down the train. Included in the high-speed section is about 1 mile of level tangent track, beyond which there is a slightly ascending grade with curves of from 1 to 1½ deg. The rails weigh 100 lb. per yard, being laid on wood ties with 24 in. spacing and placed in broken stone or slag ballast. The track was carefully aligned and tamped preparatory to the series of tests and gave extremely smooth riding conditions.

The supporting structures are of various types to illustrate different methods of construction. Beginning about 600 ft. west of the substation near the west end of the test track, and from which the line is supplied, the first thirteen bridges are of the latticed column type, while bridges 14 to 18 are Bethlehem column bridges. The structures from No. 19 to No. 23 are latticed channel bracket poles; No. 24 to No. 28, 10-in. Bethlehem bracket poles; No. 29 to No. 33, 9-in. Bethlehem bracket poles. The last structure, No. 34, is a latticed column bridge used for an anchor. The spacing of the supports is 300 ft. throughout. Several types of structure are shown in the illustrations. All of the steel structural work was supplied by the Archbold-Brady Company.

The overhead construction is of the compound catenary type, having a steel messenger from which are hung a feeder messenger and the contact wires. For the entire length of the test section the steel messenger is a ⅝-in., seven-strand high-strength steel cable. The feeder cable is suspended from it by vertical hangers of proper lengths to keep the points of support of the feeder in a horizontal plane. The form of hangers to be used has not been finally determined at yet. For the greater portion of the line the suspension was made with plain wire hangers, twisted about the messenger and the feeder. A short section was fitted with hangers made of copper tubing, flattened at the ends and bent over the cables, being held in position with bolts.

The feeder messenger for the first 4,500 ft. from the substation is a 1,000,000-circ.mil stranded copper cable and for the remainder of the line a 750,000-circ.mil copper cable.

The contact conductors are located 22 ft. above the rail. Except for a short section, between bridges 16 and 20, the contact line consists of two No. 0000 grooved hard-drawn copper trolley wires hanging side by side. The short section has two No. 000000 copper wires, being the same in all other respects. The two wires are allowed to hang freely, and touch at all points.



View of Pantograph and Method of Suspension of Contact Line

The two contact wires are hung from the feeder messenger by means of a stranded copper cable, size 0, which is laced back and forth between the feeder and alternate trolley wires. The construction is shown in the illustrations, although the proximity of the two contact wires makes it somewhat difficult to distinguish between them. The lacing cable is fastened by a clip to the feeder messenger, then at a point 5 ft. away to one of the contact wires, then 5 ft. farther along to the feeder, 5 ft. beyond that to the other contact wire, and so on. This makes a 20-ft. spacing between clips on each wire. The lacing cable is given such a tension that the contact wires are approximately 6 in. below the feeder messenger. This requires an over-run of but 5 ft. of lacing for each 1,000 ft. of line.

By means of this form of suspension each clip on a contact wire is opposite the center of the free span for the other contact wire, which is slightly below, due to the sag. It is this arrangement that has eliminated hard spots in the contact line.

In order to test the effect of spacing of the clips, some of the sections of the contact line are supported at 15-ft. points instead of 20 ft. The difference in operation has not been found noticeable.

The accompanying table gives the calculated weights and resistances for several sizes of feeder messenger.

For the current-collection tests a train was made up with a 110-ton gearless locomotive arranged for operation on 750 or 1,500 volts. The locomotive is equipped with four bipolar gearless motors and is capable of speeds up to 90 m.p.h. Behind this was a gondola in which were installed sufficient grid resistors to draw the current for the tests. By remote-controlled contactors, sections of these resistors could be inserted or removed to adjust the current to the value called for in each particular test. The gondola was followed by a coach, in which were fitted instruments for indicating the speed and the current being drawn from the trolley wire.

Normally current is taken through one pantograph of the General Electric Company's type 501. For the tests it was desired to use two pantographs, and on account of the short length of the locomotive cab, the second one was mounted on the gondola car to simulate operating conditions.

The pantographs are practically the same as those used on the Chicago, Milwaukee & St. Paul electrification, being of the sliding type. The slider pan is held against the wires by means of compressed air, the normal pressure being between 30 and 35 lb. On account of the large amount of current to be collected, the arms of the pantograph were reinforced with copper straps, and flexible shunts were provided around all joints. The contact pieces are strips of copper, placed transversely to the direction of travel. The two strips are separated by a space which is filled with a solid grease for lubricating the wire.

CONDUCT OF THE TESTS

A series of tests of the overhead construction was made on each of the three days, consisting of several different speeds and amounts of current. Each was repeated one or more times so that all the observers could watch the action, either from the train or from observation towers which had been erected at several points along the route.

The first test was made to collect 4,000 amp. from a 1,500-volt circuit at speeds of 50 to 60 m.p.h. The train was accelerated as rapidly as possible to the maximum speed, which was from 56 to 58 m.p.h., and the load applied through the grids. The second test was similar, except that the voltage was reduced to about 850. The purpose of this was to show that the difference in the contact line potential had no effect on the current collection.

CALCULATED DATA ON THE SEVERAL SIZES OF LACED SUSPENSION

WEIGHT AND RESISTANCE PER 1,000 FT. WITH TWO NO. 0000 COPPER CONTACT WIRES AND NO. 0 LACING*

Area in Circ. mils			
Feeder Messenger	Total	Weight	Resistance in Ohms at 50 deg. C. (122 deg. F
1,000,000	1,528,735	4,706 lb.	0.00752
750,000	1,278,735	3,931 lb.	0.00899
300,000	828,735	2,532 lb.	0.0139
4/0	740,335	2,259 lb.	0.0155

WEIGHT AND RESISTANCE PER 1,000 FT. WITH TWO NO. 000000 COPPER CONTACT WIRES AND NO. 0 LACING*

1,000,000	1,964,735	5,426 lb.	0.00587

* 5-ft. over-run of lacing per 1,000 ft.

The third and fourth tests were made at 5,000 amp. at 30 m.p.h and 60 m.p.h. respectively, with two pantographs. Owing to the limited capacity of the power plant and substation these high-current tests were confined to 850 volts.

Following the completion of these four tests, a fifth one was run to collect 5,000 amp. with one pantograph at speeds up to 60 m.p.h. The current actually varied between 5,200 and 5,400, the maximum speed recorded being 58 m.p.h.

In all the tests the feature remarked on was the ease of collection and absence of any sparking or flashing at the contact. In the entire series but two or three small arcs were observed. The general appearance seemed to be that the pressure of the pantograph was sufficient to lift the contact wires from their normal position some 3 in., the wires appearing to move up and down in a wave as the contact passed beneath. This was made possible by the flexibility of the lacing cable. In this way there was no opportunity for the pantograph to leave the wire. It seemed to make practically no difference whether the power was supplied at 850 or 1,500 volts, and the collection was about equally good at all speeds.

According to statements made by the engineers, 1,500 amp. at 3,000 volts is representative of a 7,000-ton freight train at 40 m.p.h. on level track. The current with such a train would range between 1,500 and 3,000, depending on the grade and the acceleration. The Chicago, Milwaukee & St. Paul freight locomotives are rated at 840 amp. continuously, and the current at the maximum tractive effort with 25 per cent adhesion is 1,200 amp. At its continuous rating this locomotive would haul 12,000 tons on the level at 15 m.p.h.

A 1,500-ton passenger train at 70 m.p.h. would take representative currents of 1,200 amp., increasing possibly to 4,000 amp. with the locomotive starting at 25 per cent tractive coefficient. It is believed by the company's engineers, as the result of the tests, that one pantograph is adequate for service where the maximum current requirement per locomotive is not in excess of 4,000 amp., and that two pantographs will take care of a maximum requirement up to 6,000 amp. The reason for the lower relative rating with two pantographs is that it seldom is possible to divide the current evenly between two collectors.

It was stated that the new suspension should apply equally well for alternating current as it did in the tests with direct current. This would remove any limitation as to contact line voltage, since if the arcing is eliminated the one great cause of trolley wire wear is absent.

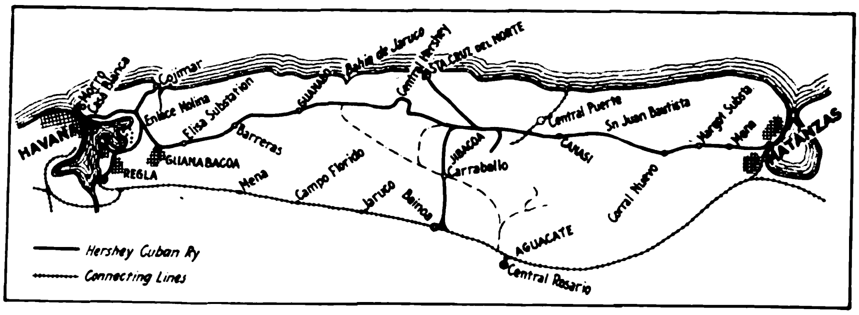
The tests were made under the general supervision of W. B. Potter, traction engineer. J. J. Linebaugh was in charge of the construction and the actual conduct of the tests.

Electric Railway Construction and Operation in Cuba—I

How and Why the Hershey-Cuban Electric Railway Was Built—Some of the Electrical Difficulties Caused by the Moist, Warm Tropical Climate and How They Were Overcome

By L. Geenens
Chief Electrical Engineer Hershey Cuban Railway

As a large user of sugar for the manufacture of chocolate, the Hershey Chocolate Corporation of Hershey, Pa., decided some years ago to build its own sugar mill in Cuba. A site, later known as Central Hershey, was selected on the north coast, half way between the ports of Havana and Matanzas, some 60 miles apart.



Map of Hershey-Cuban Railway

Successful sugar mill operation requires an appropriate network of railroad lines to convey the sugar cane from the fields to the mill and move the finished sugar to the waterfront. These lines are usually owned and operated by the sugar mill and are not in public service. They are operated during the six months of crop only. The Hershey railroad system, however, was developed on the principle that it should be a self-supporting enterprise instead of being merely an accessory to the sugar manufacture. By extending the line to Havana and Matanzas an all-year passenger and freight service could be established in addition to the sugar mill service.

A part of the road was built first to transport the construction materials for the sugar mill, which was completed in 1918. The remainder of the line was laid immediately afterward. The line passes through a hilly country, necessitating a considerable number of grades. This circumstance, together with the possibility of establishing a high-speed interurban service, led to the electrification of the line. This work was carried on together with the track laying and ballasting. The line was officially opened and electrically operated between Havana and Matanzas on Oct. 5, 1922.

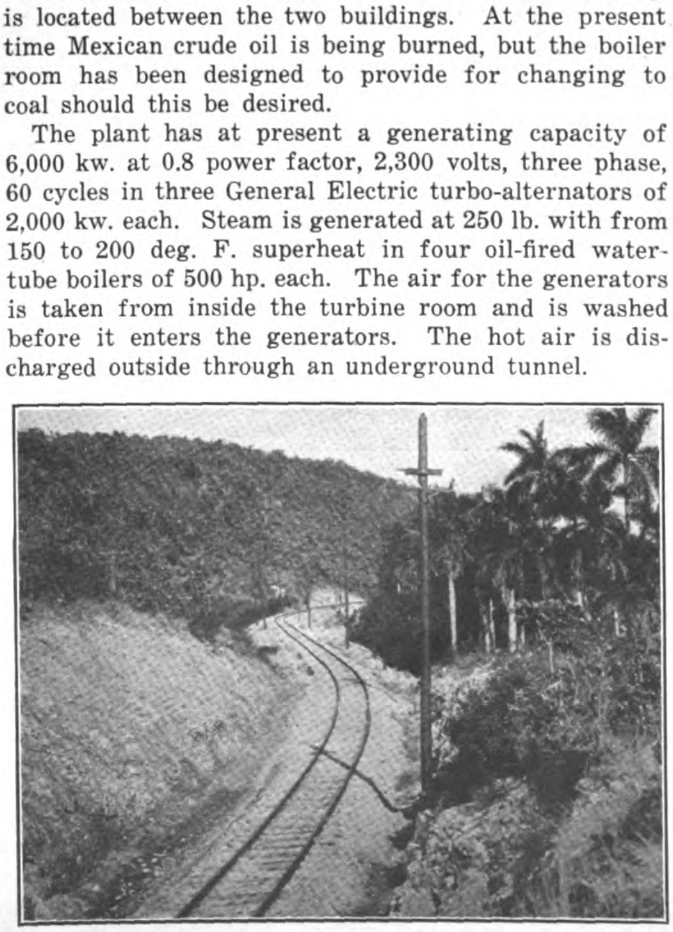
A map of the road, which is known as the Hershey Cuban Railway, is published on this page. The length of main line from Casa Blanca, across the bay from Havana, to Matanzas is 56 miles (90 km.). There are also four branches with an aggregate length of 21 miles (54 km.). The center of operation is at Central Hershey, where is located the sugar mill of the Hershey corporation, the power plant, railway shops, offices, etc.

This Line Is Equipped with a 1,200-Volt Catenary, and Though Built Primarily to Haul Sugar Cane to the Mill to Be Crushed and Then to Haul Sugar to the Waterfront, It Is Doing an Increasing Business in Passengers and General Freight

The power plant was built in 1920 and started service in February, 1921. It is located alongside the sugar mill, and the new buildings were given the same architectural treatment. The boiler house is in a separate building from the turbine house. Both are steel structures with red cement tile roofing and plastered walls. On account of the tropical location special attention was paid to the ventilation of the buildings. Both have monitor roofs with continuous sash, top hung, extending the whole length of the monitors. The engine room has five rows of top hung sash windows extending all around the building. The boiler room is open on all sides.

The turbine building is 116 ft. x 40 ft. and the boiler house is 14 ft. x 70 ft. The 200-ft. brick chimney is located between the two buildings. At the present time Mexican crude oil is being burned, but the boiler room has been designed to provide for changing to coal should this be desired.

The plant has at present a generating capacity of 6,000 kw. at 0.8 power factor, 2,300 volts, three phase, 60 cycles in three General Electric turbo-alternators of 2,000 kw. each. Steam is generated at 250 lb. with from 150 to 200 deg. F. superheat in four oil-fired water-tube boilers of 500 hp. each. The air for the generators is taken from inside the turbine room and is washed before it enters the generators. The hot air is discharged outside through an underground tunnel.



In Many Places the Road Passes Through a Tropical Forest

The auxiliaries of the turbines are electrically driven, each unit being provided with a motor-driven circulation water pump, hot well pump and air washer spray pump. The power for these auxiliaries is obtained from the main busbar through step-down transformers at 440 volts, three phase. These transformers also supply power for the house pump, crane, etc. The circulation water for the condensers is cooled in a spray cooling pond.

The 2,300-volt, three-phase bus voltage is stepped up to 33,000 volts for transmission by means of two banks of outdoor transformers of 3,000 kva. each. These transformers are single phase, oil cooled and are provided with radiators. The high-tension bus and oil switches controlling the two outgoing transmission lines are located in a separate room back of the main switchboard on the turbine floor.

An electrical connection of 300 kw. exists between the railway power plant and the power plant of the sugar mill. This current is used outside of the grinding season to operate the cranes, elevators, etc., and also, during the season, on non-grinding days.

The average kilowatt-hours generated per gallon of fuel oil over a period of two years has been 5.2 kw.-hr. as registered on the meters at the busbars. As the load increases, the kilowatt-hours per gallon also increase, and the daily average reaches as high as 5.6 and 5.8 kw.-hr. per gallon with heavy loads. There is a noted difference in the quality of oil between one tank and another and in an exceptional case 6.2 kw.-hr. per gallon was obtained.

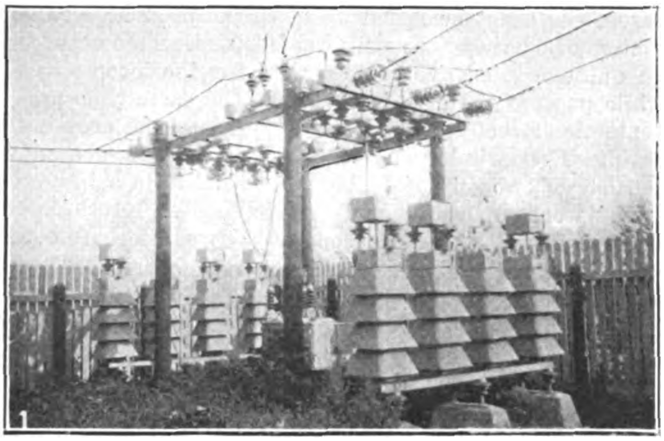
The main railway substation is located at one end of the turbine floor, and includes duplicate sets of two 600-volt, 500-kw. rotary converters connected in series for 1,200 volts. The corresponding switchboard with the air circuit breakers is installed in line with the main switchboard. One switchboard operator takes care of both the main board and the substation. The transformers for the rotaries are located below the rotaries on the ground floor inside concrete compartments separated from the plant by means of steel rolling doors. From each compartment a chimney extends to the top of the building for ventilation. There are two full automatic substations of 1,000 kw. each.

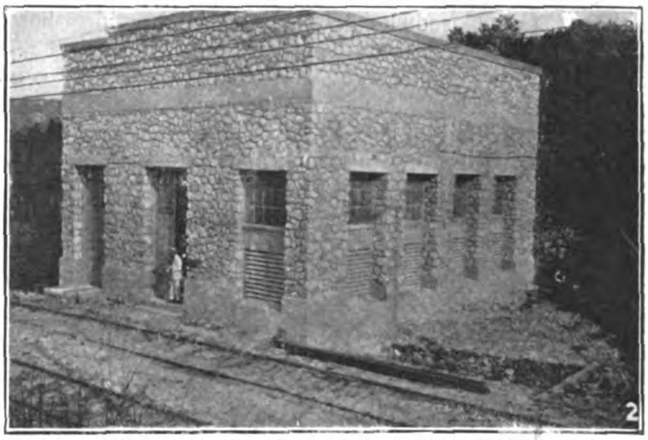
The contact wire consists of a No. 0000 grooved copper trolley wire suspended from a ten-point catenary on 150-ft. spans. The messenger is a $\frac{7}{16}$-in. Siemens-Martin seven-wire strand double-galvanized cable.

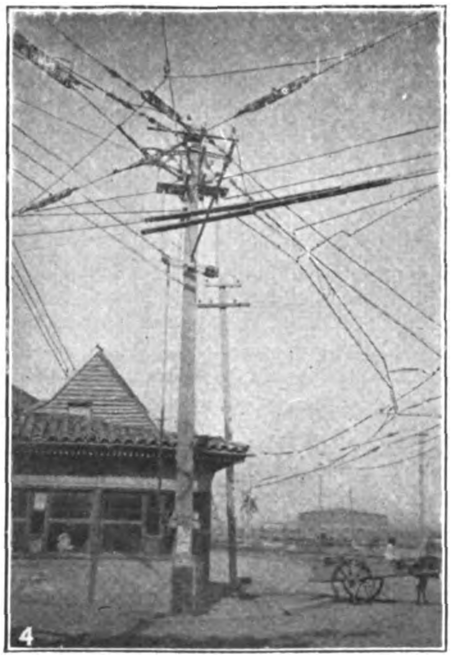
There are no splices in the trolley wire, the ends being dead ended at the mast arms. The galvanized T-iron mast arms are supported from 45-ft. creosoted poles which also carry the feeders and transmission lines.

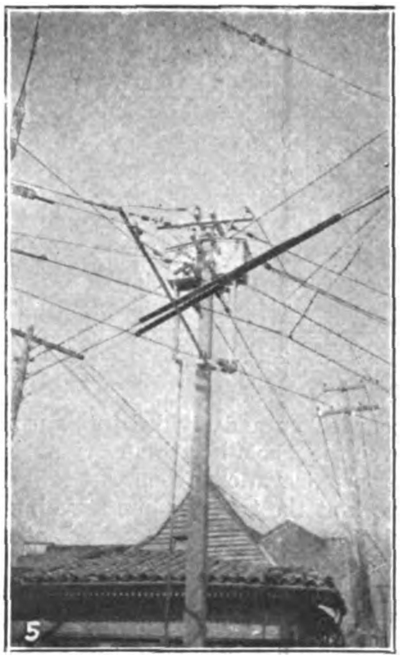
The overhead covers a total of 100 miles (160 km.) of track with 56 miles (90 km.) of main line.

An all-aluminum stranded feeder of 795,000 circ.mils extends the whole length of the line with an additional feeder of the same section extending for 8 miles each way from the main substation, this section containing heavy grades and being the concentration point of all sugar cane trains. The feeders and trolleys are cut at the main substation and enter the 1.200-volt bus through air circuit breakers. Feeders and trolleys are continuous between the main substation and each end of the line, there being no section switches. The automatic substations are tied in the system through current-limiting resistances.









Power for the Hershey Cuban Railway Is Supplied to the Trolley at 1,200 Volts

No. 1—33,000-volt outdoor metering station with short-circuiting switches to disconnect the meter without interrupting the service.

No. 2—Automatic substation at Margot, with a capacity of 1,000 kw.

No. 3—A typical narrow street in Casa Blanca.

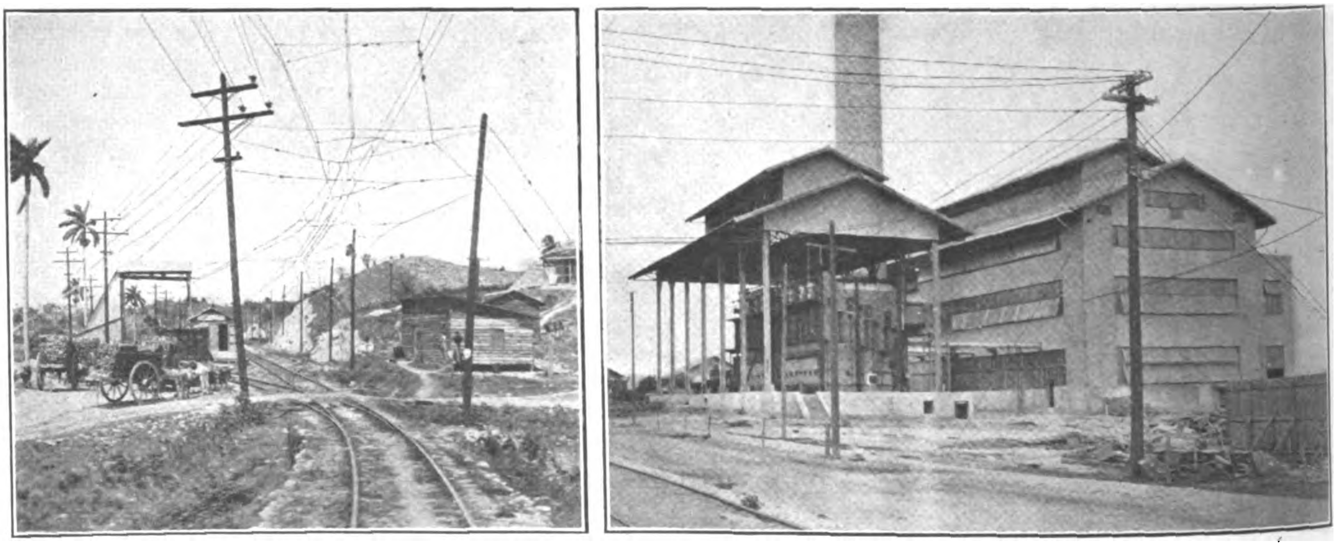
Nos. 4 and 5—The switching device at Matanzas, where the 1,200-volt line crosses two tracks of a street railway equipped with 600 volts.

The poles were set at 10 ft. from the center of track to the center of pole, at a depth of 9 ft. below the top of the rail and with a rake of 6 in. in 24 ft.

The digging of holes and also the setting of poles was given out on contracts. A first contract for digging holes was paid at the rate of $4.50 for holes in rock and $2.50 in dirt. Holes with part dirt and part rock were paid for on a percentage of these figures, corresponding to the ratio between the heights occupied in the holes by the respective materials. As the nature of the soil was not well known, this rate of pay protected both parties. Later, however, a uniform price of $3 was established as constituting an average figure resulting from the experience obtained with the first scheme. The company supplied digging tools and tents but no explosives.

The contract for setting poles was let at the rate of $5.65 for 45-ft. poles and $4.90 for 40-ft. poles. In these figures were included the removal of loose dirt in the holes, the setting of poles, installing ground cable every fifth pole, installing three crossarms with braces and pins at each pole but without tightening the bolts nor installing the lag screws of the braces at the pole. The latter adjustments were done later by the company's line crew. The contractor and his crew, all of whom were colored of British origin, were left free to follow the method of erection which suited them best and they received all possible assistance from the railway representatives. A light-weight wooden A-frame was used with an extension on the top and properly guyed with ropes. A 1-in. rope double blocked was hitched to a team of bulls and these were made to lift the poles. A crew of ten men would erect from six to eight poles per day. This work was carried on in 1919 and 1920, a time during which a severe labor shortage was experienced. It was completed during 1922, when conditions were more favorable, and a contract price of $5.50 was obtained covering both the digging of the hole and the setting of the pole.

The erection of the overhead lines was done by the company itself, as no competent contractor could be found for this kind of work. It was soon apparent that British colored labor from Jamaica and other British possessions was best suited for this work. They are steady workers, are good climbers, like good food and thus are physically fit to render such heavy work under a tropical climate. Some of these men had acquired knowledge of line work at the Panama Canal, others were trained by the superintendent in charge of lines. A crew of nineteen men including a cook was lodged in sugar cane cars which had been properly boarded up and divided into rooms. A floor was built over the whole length and width of each car and at the proper elevation from the rails to allow linemen to work at the trolley while standing on this floor. These platforms were very convenient for all trolley work. When installing the hangers of the catenary, the whole camp was pulled out and constituted a continuous platform extending over more than one span. The crew was distributed along this platform at 15 ft. apart, and the ten hangers of the span were installed at the same time and with only one stop of the locomotive.


Left—Typical Siding and Cane Loader. Right—Owing to the Tropical Conditions, the Turbine Room Is Provided with More than the Usual Amount of Ventilation, and the Boiler Room Has a Roof with No Sides

A reel car for eleven reels was made in the shops and used to pay out all the conductors. The No. 0 aluminum transmission cable and the 750,000-circ.mil aluminum feeders were paid out on the ground along the track and lifted on the poles at the same time that the insulators were installed and the bolts of the crossarms tightened, all this constituting one operation for small gangs composed of two linemen and one ground man.

During rainy days the crew was kept in the camp and made to prepare trolley dead-ends, cement messenger insulators and in general prepare line fixtures.

The guy anchors were made up of concrete blocks, 19 in. x 19 in. square, 6 in. thick in the center and 3 in. on the sides. A 1:3:5 mixture was used with ¾-in. stone. Twenty-five concrete poles of 38 ft. and 45 ft. heights were built and installed where city regulations prohibit the use of wooden poles.

OVERHEAD CROSSINGS WITH 600-VOLT LINES

Two crossings occur between the 1,200-volt catenary of the railway and the 600-volt direct-suspension trolleys of local street railway companies. One is in the city of Matanzas and the other at Regla, a suburb of Havana. In the first case two street railway tracks at 60 ft. apart cross the railway's track in a sharp curve and grade. As heavy freight trains pass here, coasting across could not be relied upon, so the protective zone system of overhead crossing was adopted. This assures an uninterrupted live contact wire for the locomotives while passing the crossings and at the same time prevents the street cars from coasting into the crossing train. The switching outfit was made up locally and consists of two sets of double-pole switches in asbestos-lined wooden boxes and mechanically interlocked through a rocker bracket operated from the ground. The switches are normally set for 600-volt operation over the crossing and are locked in this position by means of a railway switch lock. Train crews throw the switches over to 1,200-volt operation when they approach the crossing. No signals are needed as it is physically impossible to coast through the dead zones because of the existence of sharp curves and grades.

The second crossing between the 1,200-volt catenary and a 600-volt direct suspension was more complicated because of the existence of both a positive and negative trolley wire at 18 in. one from the other. Three such crossings existed at distances of some 150 ft. apart through city blocks and in an unusually narrow street. A switching system with protective zones would not have given the results expected as the street cars were able to coast into the crossing from a long distance back, due to a combination of grades in the streets. As an experiment, a system of overhead crossing pieces was developed locally whereby the two wheel trolleys of the street car pass with an uninterrupted live contact wire while the pantographs slide through the crossing without coming in contact with the 600-volt wire. The 1,200-volt catenary is killed for a distance of 5 ft. each side of the crossing.

The device consists essentially of two wooden troughs containing the wheel trolley wires and a system of hinged wooden flappers which are pushed across the troughs by the pantographs and thus prevent the latter from rising so as to touch the 600-volt wires. The device was made of Cuban hardwood, which resists the climate better than iron and needs no painting.

The 33,000-volt outdoor metering stations, for metering current sold to distributing companies, of which one is shown on page 129, were built on the principle that as little iron as possible should be used and where employed it should be so located that it can be painted without having to kill the station. It should be explained that paint is used because galvanized fixtures show rust within a year and some even get rusty while in transit. Iron exposed to the weather and the salt mists in Cuba has to be painted twice a year.

The meters and lightning arresters were set on the ground on concrete bases. The disconnecting switches and choke coils were installed on timbers which, in turn, are supported from I-beams bolted to four creosoted poles. These timbers are of native Cuban wood called "caoba" and will resist the weather better than the iron and need no painting.

BONDING

Acetylene-welded bonds of No. 0000 B.&S. copper strand were installed on both rails of the main line, while on sidings only one rail was bonded. A competent contractor undertook this work at 95 cents per bond, the railroad supplying him with a powerful motor car for moving his equipment along the track. All expenses of gasoline, acetylene gas, etc., were paid by the contractor. This welding was done during the night, as the extreme heat of the day was a handicap for the welders.

Mexican crude oil was splashed on the bonds while hot for the purpose of discouraging stealing. Only a part of the bonds were so treated, however, as it increased the labor cost materially. Thus far, there has been no stealing of either the treated or untreated bonds. Both rails are grounded at each stream crossed by the railroad in order to eliminate any possibility of potential on these rails.

OVERCOMING FLASHOVERS ON THE TRANSMISSION LINES

The railway does some commercial light and power business in the localities served by the railway. The power is sold wholesale at 33 000 volts, three-phase, to local distributing companies through high-voltage outdoor meters. The most important of these companies is the Matanzas Public Service Company, operating in the city of Matanzas, at the eastern terminal of the railway.

The transmission lines are carried on the trolley poles and consist of No. 0 aluminum steel-reinforced cable on 150-ft. spans, supported on pin-type insulators with steel pins, wooden crossarms and angle-iron braces. Insulators of 45,000-volt rating were installed.

The experience of other power companies operating high-voltage lines in Cuba had shown that some trouble was to be expected from the presence, during the winter months, of mists entraining a very appreciable amount of salt from the sea. The first line was put under tension in March, 1921, between the power plant and Matanzas. Trouble did not develop, however, until the following fall. On certain nights, insulators located on steel towers near the plant and at the end of the line along the seashore flashed over, tripping the line. On such nights, all the insulators of the line show a corona light between petticoats. When the sun rises, the moisture on the insulators dries and the phenomenon disappears.

An examination of the insulators showed that those located on the steel towers which carry the lines through city streets were heavily coated with dust raised from the street, while the insulators along the right-of-way were fairly clean. An analysis of this coating showed 8 per cent salt by weight. Rain would wash the insulators, but as there is no rain for months at a time, the combination of dust, salt and moisture soon develops into a hard coating which gradually becomes more conductive.

To remove this coating the insulators were first washed at intervals with a solution of caustic soda. This washing was done between 4 and 6 a.m., as this was the only time available. It developed, however, that unless the insulators were wiped dry, flashes would take place as soon as the voltage was re-established. Experience showed that a dry wiping with paper while the insulators were moist was more effective in removing the salt.

This phenomenon disappears in the spring, toward March, and is never noticed during the summer or fall.

To overcome these troubles the insulators were set on wooden crossarms in turn bolted to the steel towers. This was an improvement, but toward the end of the following winter the insulators flashed over again when enough dust and salt had accumulated. The crossarms had also a tendency to burn.

It was then decided to introduce a higher insulation on all steel structures. Hewlett strings of four 15,000-volt disks were installed, and, wherever needed, 60,000-volt pin-type insulators were used. This plan proved entirely successful in eliminating flashovers.

It will be interesting to note that the same 45,000-volt insulators on wooden poles are not flashing over, although some are exposed to the same dust and atmospheric conditions. An extension of the line was built last fall and was carried on steel poles along the bay of Matanzas and thus directly exposed to the salt mists. Strings of four disks with metal caps proved entirely unsatisfactory. All sorts of insulators on hand were tried. Disk insulators without metal caps stood up better than those with such caps, and pin types with many small petticoats proved more satisfactory than when a few large petticoats were used. Where string insulators were maintained, six disks were introduced.

It should be noted that this phenomenon was also felt on the steel towers and outdoor bus structures at the power plant, located 3 miles from shore, showing that this condition is not localized near the sea but penetrates inland for quite a distance. On such nights the air is usually calm. On windy nights it would not take place.

Although the dust accumulating on the petticoats acts as a support for the salt and thus encourages the flashovers, certain cases show that even with a clean insulator a breakdown will take place under severe atmospheric conditions. On several occasions wooden crossarms on steel towers caught fire through leakage over 60,000-volt pin-type insulators, where 1 ft. of crossarm separated the steel pin of the insulator from the tower proper. These insulators were found to be as clean as could be expected anywhere.

During these cases, the other insulators on the towers show sparks between the lower petticoats and crossarms and sometimes along the crossarms all the way to the towers.

These conditions last for one hour or so in the early evening. During that time a cold mist has been noticed which is carried over from the sea.

The lightning period lasts from April until October and corresponds to the "rainy season" of tropical climates. During this period, there is a lightning storm practically every day around 2 p.m. Certain localities are more exposed to these storms than others. It was observed that some 90 per cent of the storms would occur east of Central Hershey, while very few would occur on the west. There would be more direct strokes on the Bainoa branch and near the Margot substation than on any other part of the line. The hills around the substation may account for this particular exposure.

The transmission lines are protected by means of oxide film arresters and, in addition, there is a ¼-in. steel ground cable over the lines east of Central Hershey, while on the west the ground cable has been omitted. The substations are protected on the trolley side by means of aluminum cell arresters and the electric cars are also protected with arresters of this type.

During the two years of operation, the voltage was never off the transmission line because of lightning troubles, although a considerable number of strain insulators were shattered on the trolley lines located below the transmission. Insulators of pantographs also were blown up, and direct strokes entered the substations and did considerable damage to apparatus. In general, experience has shown that the lightning discharges in this district are violent and very destructive and that the best lightning protection should be applied.

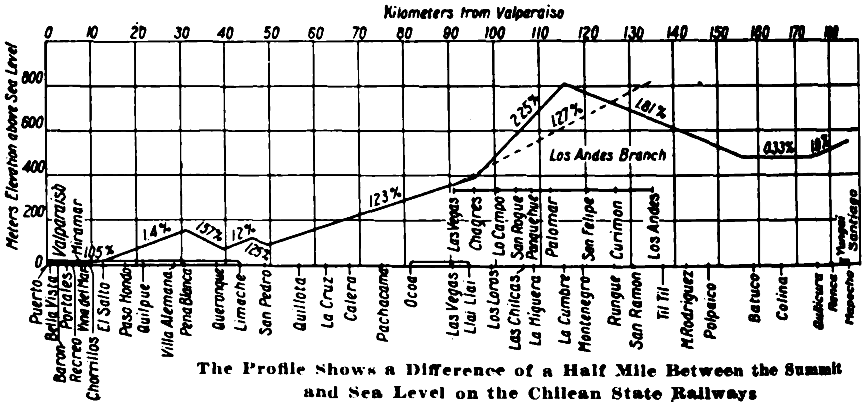
Rolling stock and transportation methods will be treated in the second and final installment of this article.

Chile Inaugurates Electric Operation

The President of the Republic, Acting as Engineer, Operates First Train—Report on Status of This Project Brought Up to Date—Details Briefly Reviewed

PRESIDENT ALESSANDRI of Chile occupied the engineer's cab on the first electric train to run from Santiago to Til Til, thus inaugurating electric operation on the Chilean State Railways. The large number of guests who attended the inauguration of electric operation included the Secretaries of the Interior, State and Industry, Railroads, War and Justice, the United States Ambassador, Hon. W. M. Collier; the Colombian Minister, Señor Carlos Uribe; the Director of Railroads, Señor Jaramillo, and other high officials of the railroads, and the engineers from the firms of Errazuriz, Simpson & Company and the Westinghouse Electric & Manufacturing Company.

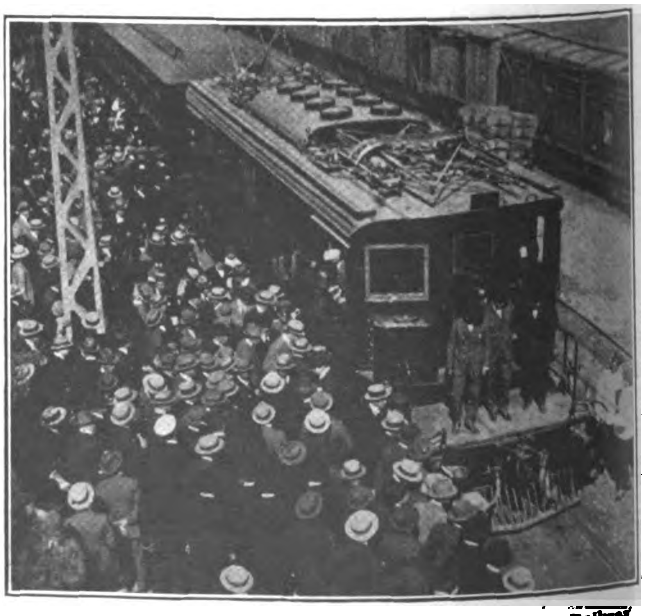
It will be remembered that this electrification contract, awarded to the Westinghouse Electric & Manufacturing Company, amounted to $7,000,000, and involved the electrification of 144 route-miles, 116 from Valparaiso to Santiago, and 28 in a branch from the main line to Los Andes. Already 90 per cent of the concrete posts are in place, and the majority of the feeder lines and catenary trolley wire is up. About 6,500 posts and 1,200 tons of copper, aluminum and steel cables are required.



The Profile Shows a Difference of a Half Mile Between the Summit and Sea Level on the Chilean State Railways

There are five substations involved which transform the high-tension, three-phase current from the hydroelectric power plants to 3,000 volts d.c. as used on the locomotives. The two power plants, Maitenes and Florida, are owned by the Compania de Electricidad, Ltd., and are located on the Maipo River. The substations are located at Quilicura, Rungue, Llai Llai, San Pedro, and Vina del Mar. The first and last of these receive 12,000-volt current and the three others 44,000-volt current. Each substation has two 2,000-kw. motor-generator units and is divided into two compartments, one for the transformers and one for the motor-generator sets.

The buildings are entirely of steel and concrete and are completed. The installation of all electrical equipment has been completed at the Quilicura substation, and is rapidly nearing completion in the four others. The line material, transformers and electrical equipment for the substations filled sixty-five railroad cars when shipped from the Westinghouse works and required two steamers to transport from Philadelphia to Valparaiso.



Greeting the First Electric Train on the Chilean State Railway at Til Til

The contract included thirty-nine electric locomotives which will replace more than 100 steam locomotives. There are six express passenger locomotives of 2,250 hp. and weighing approximately 130 tons. They will carry first and second-class cars between Santiago and Valparaiso at a maximum speed of 62.5 m.p.h. These have six motors, are of the 2-6-0+0-6-2 classification and are designed for regenerative braking, which not only provides greater safety on the down grades and saves wear of brakeshoes and wheels, but actually returns energy to the lines. These locomotives have all been delivered and are assembled.

There are fifteen road freight locomotives of 1,680 hp., weighing 115 tons each and developing a speed of 40 m.p.h. These locomotives have six motors and are of the 0-6-0+0-6-0 classification. These locomotives have also been delivered.

There are eleven local passenger locomotives of 1,500 hp. and weighing 80 tons. These will be used in local service with frequent stops and carrying first, second and third-class cars at a maximum speed of 56 m.p.h. These locomotives have four motors, duplicates of those on the express passenger locomotives. They are of the 0-4-0+0-4-0 classification. These locomotives are rapidly nearing completion in the Westinghouse works at East Pittsburgh.

In addition to the passenger engines, there are seven switching locomotives of 480 hp., weighing 67 tons and developing a speed of 34 m.p.h. These locomotives have four motors and steeple type cabs. Some of these are now on the way to Chile, and the balance will soon leave East Pittsburgh.

This Chilean electrification project has been fully covered in earlier articles in ELECTRIC RAILWAY JOURNAL which appeared as follows: Vol. 59, page 151, 309, 667, 988; Vol. 60, page 325.

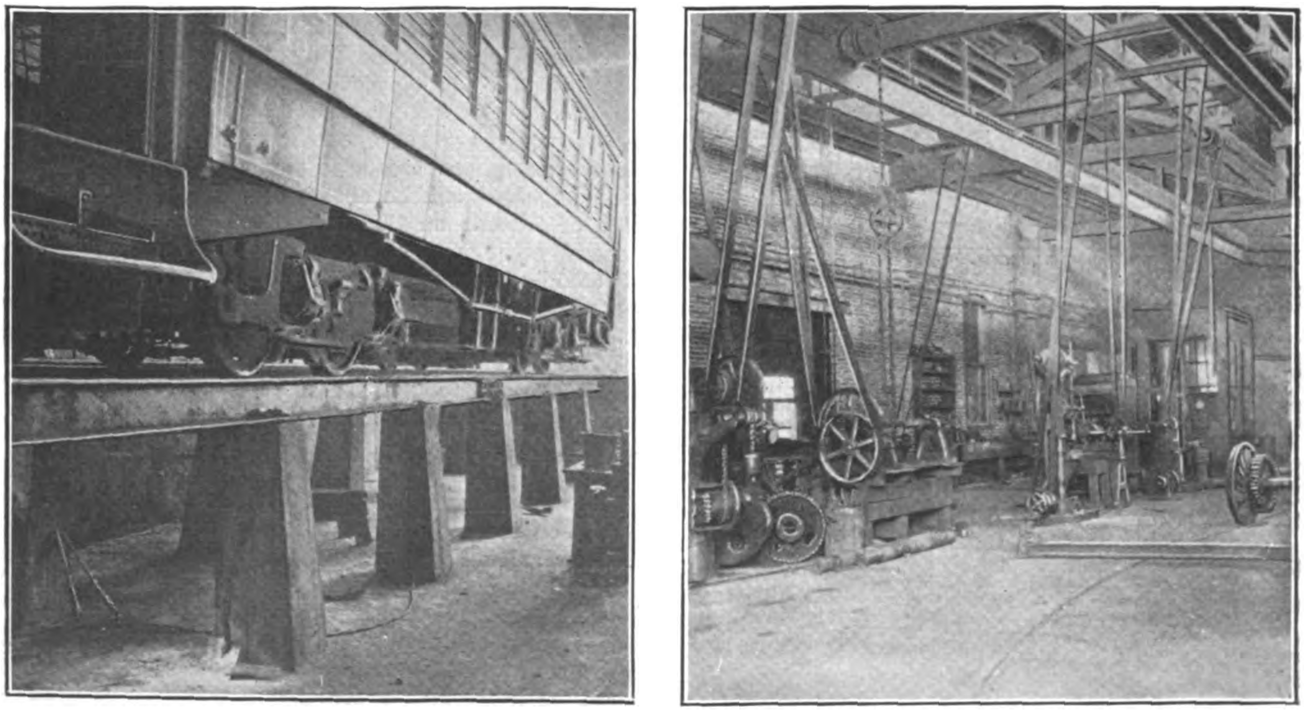
Observations on the Railway Situation in Three Virginia Cities

In Hampton, Newport News and Roanoke the Solution of the Transportation Problem Is Frequent Service—Fares Are Low, but Proximity of Residence and Business Districts Encourages Pedestrian Competition

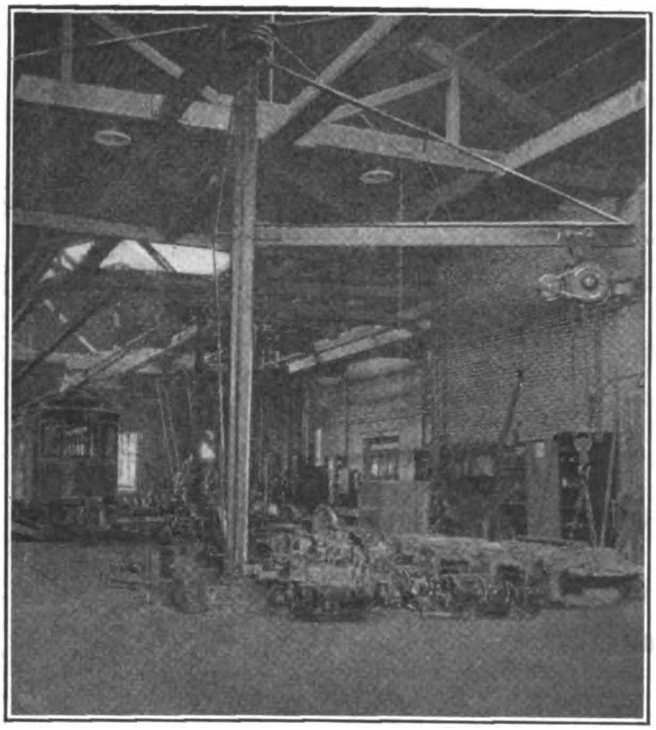
By "Spectator"

AT THE time I visited Hampton, last month, the Newport News & Hampton Railway, Gas & Electric Company was in the throes of a voluntary valuation which was being made at the suggestion of the state commission. This was to be submitted to the several municipal councils involved and if acceptable will be made the basis of future negotiations. The company was assisted in this work by W. D. Maltbie of Baltimore, but the appraisal was the work of the company's staff. The fare is low, being only 5 cents per zone. There are three zones on the system—Newport News, Hampton and Phoebus and Old Point Comfort.

While the fare in each zone is low, by present-day standards, the cities served are of such size that many

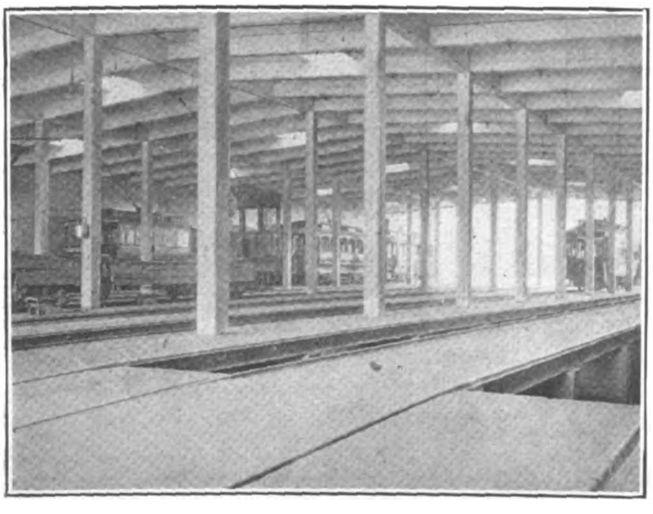


Left—Overhauling Work Is Facilitated at Hampton by This Substitute for Pits. Right—Skylights Give the Machine Shop a Cheerful Appearance



Mechanical Devices Are Used to Eliminate Manual Lifting and Carrying in the Hampton Shops

Coal for the Power Plant at Roanoke Is Handled by Means of a Traveling Clamshell Bucket



The Carhouse at Roanoke Is Fireproof and Is Well Provided with Inspection Pits

patrons would walk if it were higher. The same principle applies to the service given, which is more liberal than the traffic warrants, also judged by usual standards. The traffic is unusually sensitive to headway. Fortunately this company has a diversified business which enables it to weather the storms of electric railway tribulation.

The present fare of 5 cents is the result of a recent reduction from 6 cents. The effect of the reduction was increased traffic on some lines much more than sufficient to make up the difference; on other lines this was not so. The net result was a slight reduction in income so far. The ultimate result will be awaited with interest.

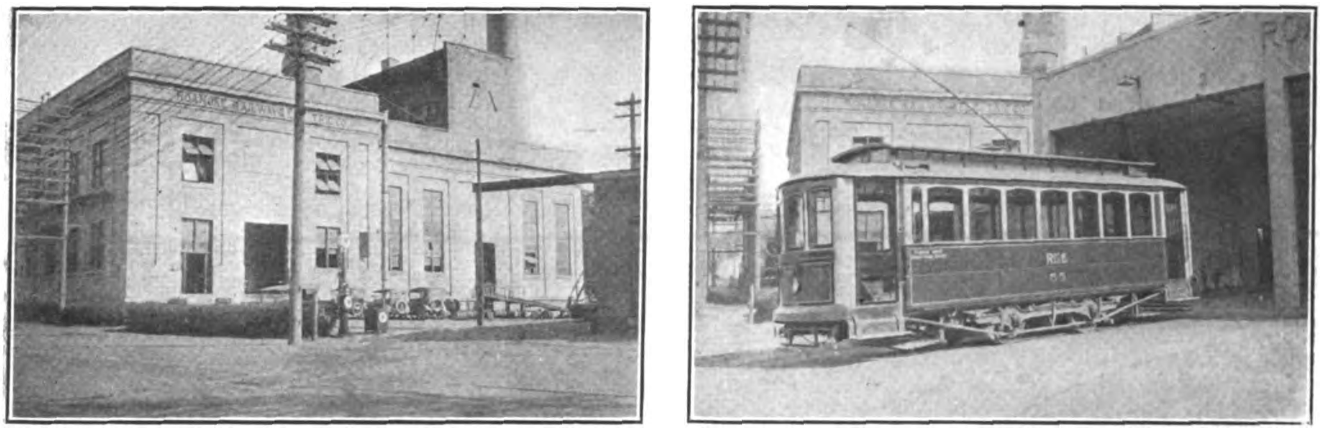
I was impressed, at Hampton, by the shop layout and procedure, which for a property of moderate size seemed unusually good. The shops are laid out to facilitate simultaneous work on different parts of a car while it is undergoing overhaul. Cars are completely overhauled after they have made 75,000 miles, or at the rate of two cars per month. Two spare equipments are kept constantly on the floor ready for installation. As a result of close attention to details there were last year only 359 failures of equipment for nearly 1,700,000 car-miles, involving more than 21,000 operations. There were but fourteen armature failures and one field failure. In these shops the moving of heavy objects by manual labor is reduced to a minimum.

ROANOKE ALSO OPERATES ON A 5-CENT FARE

On the way to Bluefield to study the Norfolk & Western electrification, I stopped off at Roanoke, which is the administrative headquarters of the N. & W. I found President N. D. Maher and his associates full of enthusiasm for electric operation and desirous of extending it. An interview with Mr. Maher, published in the July 14 issue of this paper, in my opinion reflects the attitude of the railroad management toward this important development.

The electric railway problem in Roanoke is similar to that at Hampton. The local utility, the Roanoke Railway & Electric Company, is a subsidiary of the American Electric Power Company, formerly the American Railways Company of Philadelphia. As in the case of most combined utilities, the non-railway section of the property has of late years been more profitable than the railway, and it is due in part to this situation that the company has been able to give service at the low fare of 5 cents on the urban lines. J. W. Hancock, general manager, explained that the company is restricted by its franchise to a 5-cent urban fare, but that on the line running from Roanoke to and through Salem (9 miles) there are three 5-cent zones, with ticket fares of 10 and 12½ cents. The company also operates cars from Roanoke to Vinton (3 miles). Another factor which enables the company to maintain a 5-cent fare is that the average length of ride in the municipalities is short.

The company is now building additional passing points on the interurban division. It is getting from another subsidiary company six cars, which are being released there by new cars of lighter weight. These four-motor double-truck cars fit in very well, after some remodeling, with the present equipment at Roanoke. With these additional cars and improved track facilities the company will be in position to cut the headway on the interurban division in half. Getting these cars at a low valuation the local company can



At Left, the Roanoke Power Plant. At Right, a Typical City Car at the Entrance to the Carhouse

furnish the added service without proportionate increase in overhead expenses. While on a large property the addition of a half dozen cars might not seem important, it means an increase of nearly 15 per cent here.

The company is also reconstructing some of its old car equipment for one-man operation.

The management believes that with improved car service between Roanoke and the suburban towns of Salem and Vinton the use of private automobiles will be decreased. Of assistance in this is the difficulty of securing parking places for automobiles in the downtown district, the streets of Roanoke being narrow.

The Readers' Forum

Use of Welding Wire Specificatians Urged

City of Detroit
Department of Street Railways
Detroit, Mich., June 25, 1923.

To the Editors:

I was much interested in the editorial on page 992 of the Electric Railway Journal for June 16, 1923, under the caption "Railways Should Use Welding Wire Specifications Drawn by Welding Society." Would it not be a good idea for the Electric Railway Journal to publish these specifications in toto, either as an insert or a permanent part of some future issue, in order that they may be more readily available to electric railway users?

Our welding division, particularly in the winter time, does considerable reclamation work for other divisions, such as welding gear cases, making repairs to track machinery, etc. This work covers not only iron and steel but brass, copper and, in one or two instances, we have had occasion to weld aluminum.

It is my opinion that the only way to have these specifications put into practical use is to cram them into the users' heads. While they can be obtained from the American Welding Society at what may be considered a nominal price, still there seems to be no disposition on the part of electric railway users to purchase welding wire according to these specifications. A campaign of education should be taken up in order to create more particular interest.

H. M. Gould,
Electrical engineer.

[The editors agree with Mr. Gould that the practical use of the welding wire specifications, as published by the American Welding Society, has been neglected by both the electric railway operators and manufacturers. It is hoped that by publishing Mr. Gould's letter attention will be called to the desirability of these specifications, leading to their more general adoption.

There is always great pressure on the columns of this paper for the publication of news and articles relating to electric railway practice. For this reason the editors would prefer, if possible, not to publish the welding specifications in full, believing that the readers would prefer to have that space devoted to material which cannot be obtained elsewhere. The American Welding Society is the logical publisher for welding specifications, and these specifications can be obtained from the society at a nominal price.—Editors.]

Electric Door Operating Mechanism

The West Penn Railways, Connellsville, Pa., being equipped with magnetic brakes, has no compressed air supply on its cars for the operation of auxiliaries. A simple door-operating mechanism has been worked out, which is quite as satisfactory for this company's service as the standard pneumatic control.

Center side doors are employed on the interurban cars. They are of the standard folding type, there being two doors at each side, and each door consists of two leaves, hinged together. The doors on each side of the car are equipped with an independent control. This is accomplished through the use of a small 250-volt electric motor, which moves the doors through a system of spur gearing. The power supply is controlled by small drum controllers, one for each side, located above the conductor's compartment in the middle of the car. These drum controllers may be operated from any position in the car through the use of cords, similar to the bell cord. Should the doors be closed, a pull on one of these cords moves the drum controller, to which it is attached by means of a ratchet, so that the motor is energized and the doors opened. A second pull on the cord will close the doors. The doors on either side of the car may be controlled independently.

The use of this device permits the conductor to move freely through the car, collecting fares or performing other duties, but still having the doors under his control at all times. In this way the car operation is facilitated.

Handles are provided above the doors, so that merely by turning the large gear they may be operated by hand. The operating mechanism is not disturbed by this procedure, so that no complicated connections are needed to provide this emergency feature.

Association News & Discussions

Public Relations and Freight Main Topics at C.E.R.A. Summer Meeting

Three-Day Convention at Cedar Point, Ohio, Has Usual Interest—Engineering Council Reports on Work Done Toward Development of Best Practices—Better Public Understanding of the Railways Was the Keynote of the Convention's Mission

THREE HUNDRED strong, the men of the Central Electric Railway Association and their families gathered at the famous Cedar Point summer resort on Lake Erie for the annual summer convention. While many felt that this was not the equivalent of the usual six-day cruise on the Great Lakes, the land convention was at least a welcome change and every one seemed thoroughly to enjoy the meetings and the recreation. There were five morning and afternoon business sessions on July 18, 19 and 20, with the question of public relations standing out as the predominant interest of the convention. Some time was also devoted to engineering subjects, the Engineering Council having charge of the Thursday afternoon session and making report on the results of its endeavors. Another meeting was largely devoted to the subject of freight traffic.

A dance on Wednesday evening and a banquet on Thursday evening comprised the planned entertainment aside from that afforded by the popular beach and other Cedar Point amusements. At the banquet, J. P. Barnes, president Louisville Railway and president of the association, ably presided, as he did over the business meetings. The principal speaker at the banquet was John B. Maling of New Haven, Ind., whose subject was the "Origin and Effect of Class and Freak Legislation." In a most interesting exposition of facts, he pointed out the great dangers in our present political tendencies and inspired the delegates with the need for every educated citizen to give something of his time and effort in support of the constitution and the fundamentals of our form of government. At this banquet, the delegates were entertained by the Inspectors' Quartet of the Louisville Railway. whose songs were enthusiastically received.

THE PRESIDENT'S ADDRESS

At the first session, on Wednesday morning, President Barnes addressed the convention briefly, as follows:

"Looking over the programs of conventions of railway associations, during several years the predominant note will probably be found to be an ever-increasing emphasis upon the position of the railway as a public servant, accompanied by an increasing breadth of vision as to the real meanings of this public service. Now service is of many kinds and each wears its own and appropriate livery. Mark Twain in the 'Yankee in King Arthur's Court' makes the Yankee complain of the discomfort of his armor. In response King Arthur points out to him that armor is the livery of knightly service and is a proud burden proudly borne. So should the livery of the public servant be proudly worn in the knowledge that our service, well and truly rendered, does indeed make livable the modern city, and that without it the people would perish.

"More and more emphasis is being placed from year to year and from convention to convention on public relations. The importance of frankness and honesty in public relations is no longer a matter of discussion, so obvious has it become and so generally recognized. We have truly reached the day when 'backstairs' are obsolete and our proud being of public service is unashamed to enter by the front door of commission or executive office.

"All of this is neither novel nor unfamiliar to this audience and is mentioned here but as the background for the picture of our industry today. The problems—many of them—of today will be discussed as our program unfolds, and there remains for your presiding officer but one thought to express before we proceed.

"Inward conditions will find reflection in external relations, as truly in corporate as in individual life. Seldom is the dyspeptic individual a pleasant companion, and seldom is the internally sour corporation a pleasant or efficient public servant. I doubt if an unpleasant public servant can be an efficient one, for the delicate adjustment of correct public relations depends largely on the cordial public reactions that arise from pleasure in the service received.

"I doubt, also, whether pleasure can be derived from a service which is not touched with some degree of pleasure in the service itself by the one who renders it. How could you or I, working under conditions of discomfort, restraint and uncertainty, render a service to any person that would be productive of real pleasure to that person? How can any employee of our corporations do that thing?

"Let us look, then, to the adjustment of our internal mechanisms. Let us see that methods and working conditions are not only reasonable but as comfortable as may be. Let us take a real interest and concern in the state of mind of our company's employees. And, let us go to trouble, expense and personal inconvenience, if necessary, to understand the mental and spiritual, as well as the physical, conditions under which our public service is rendered.

"Would we be efficient public servants, let us be pleasant public servants, and let us see to it that each individual on our payrolls gets the vision, so far as we can carry it to him, and reflects in his individual attitude to his labors the attitude of the corporation to its public service—a proud burden proudly borne."

Following the president's address, Secretary L. E. Earlywine made an extended progress report on the various activities of the association. He showed the association to be in a healthy condition financially and that the committee work was well in hand. Among things done by the Central Electric Traffic Association, as noted by the secretary, an item of general interest is the decision that value of excess baggage carried will be limited to $500 for any individual. Another item was the conclusion reached by a vote of eighteen lines for and eight opposed, that the present per diem charges for freight equipment on interchange, of $1 a day for the first seven days and $2 a day thereafter, should be increased to $5 a day after five days.

Progress reports were made by James Harmon for the safety committee, John S. Bleecker for the publicity committee, and M. B. Lambert for the supply men's committee.

DISCUSSION ON FREIGHT POSSIBILITIES

That the future success of the interurban lies in the further development of the freight business was the opinion of T. H. Stoffel, whose paper on this subject appears elsewhere in this issue. That it is a profitable venture for the interurban railways was largely concurred in by those who discussed the paper.

J. S. Bleecker raised some questions as to the proper method of allocating expenditures between freight and passenger service, which induced considerable discussion, the gist of which was that regardless of the accounting details as to the manner of distributing expenses, if the final result shows a net earning larger than without the freight business, then the freight business is profitable. It was brought out, however, that there must be a reasonably accurate allocation of expense, in order that it may be possible to avoid taking classes of business which are unprofitable.

Attention was called to the standard allocation recommended by the American Electric Railway Accountants' Association, which makes the division on a mileage basis as to fixed charges and divides employees' salaries in proportion to the time actually spent in each branch of the service. It was thought that although the freight business could be classed as a by-product at the start, after it reaches the point that it is responsible for 50 per cent of the gross revenue, then it should be classed as a separate department and the fixed charges carefully allocated.

Harry Reid, president Interstate Public Service Company, said that six years ago the freight business on his property amounted to 6 per cent of the gross revenue, while today it is in excess of 42 per cent of the gross. He mentioned the additional equipment and facilities which have been provided for handling freight and pointed out that in addition to the direct benefit to the railway in the way of increased revenue, there has also been an indirect benefit as a result of the favorable attitude created with the people on account of this additional transportation service.

Charles L. Henry, president Indianapolis & Cincinnati Traction Company, spoke to the effect that he believed the success of the electric railways depends in final analysis on the freight business, for it certainly is not apparent that the passenger business is going to increase sufficiently to make money for the interurbans. As evidence of his faith in the prospects for hauling freight in a profitable way, he referred to the extensive freight terminal that is about to be built in Indianapolis as a joint proposition of the several interurban lines entering there. He said this would probably be the finest interurban freight terminal in the United States.

Recognizing the fact that the private automobile, motor bus and motor truck are certain to find a traffic which they can haul profitably, Mr. Henry said that the interurban railways must develop that kind of traffic which the automotive vehicles cannot economically handle. As an example of this he cited the hauling of livestock by the Indiana interurbans and reviewed the circumstances which led the farmers to propose and support the passage of legislation authorizing the hauling of livestock through the city streets. This livestock service now brings an average of 170 carloads of business per month.

L. G. Parker, Cleveland Frog & Switch Company, said that the Cleveland Chamber of Commerce had been influential in bringing the electric lines a 200 per cent increase in their freight business during last year. This was distributed among the interurban lines in proportion to their ability to handle it.

H. A. Nicholl, general manager Union Traction Company of Indiana, expressed some doubt as to the general profitableness of livestock haulage. He said that where it was necessary to make long hauls in one direction and operate empty on the return trip, it was difficult to show a profit. He pointed out also that a great many things, such as lack of standardization of cars, sufficient capacity of sidings and stations, and lack of co-operation between traffic men on foreign lines, tended to prevent the building up rapidly of a profitable through freight business.

A timely meeting of the committee on standardization of freight equipment was called immediately following this discussion.

P. V. C. See, Akron, Ohio, said, in regard to freight equipment, that the Northern Ohio Traction & Light Company had at first made use of reconstructed passenger cars, built over with round ends and nicely painted and having a length of 50 ft. With this equipment there had been no trouble with the various municipalities through which the line runs, but it was found that trouble developed from overloading, from too great speed, and from the fact that the cars were too long. This resulted in high maintenance expense. On the freight cars purchased since the original equipment, the length has been reduced to 40 ft. and the gear ratio reduced so that the possible speed is 30 m.p.h. instead of 50. This has materially reduced the operating cost, one factor being that the 40-ft. cars are built very strong.

Mention was made of the possibilities of the interurban railways going into the pick-up and delivery service and Mr. Barnes said that in connection with a survey of the Kentucky lines of the Louisville Railway Company by A. C. Eastman, it had been recommended that the railway not enter into this character of service as it is seldom profitable.

MANUFACTURERS' PART IN DEVELOPING RAILWAYS

A paper on "What Manufacturers Have Done for the Electric Railway Industry" was presented at the Thursday morning session by H. L. Andrews, railway engineer General Electric Company. In this paper, Mr. Andrews summed up the imposing list of contributions which the manufacturers have made in the development of transportation equipment and power apparatus. The period through which the railways have been passing has called for methods of increasing the earnings and reducing the expenses. Working in these directions, the manufacturers have produced the Birney safety car, which Mr. Andrews said is responsible for adding from $17,000,000 to $18,000,000 to this year's net earnings of more than 400 companies using them. The extension of the safety features and one-man idea to other city and interurban cars is adding further savings which probably amount to about $4,000,000. The low-wheel light-weight interurban and city cars in use on more than sixty city and interurban properties will add more than $5,000,000 to this year's net earnings of the companies using them.

Other contributions of the manufacturers are the automatic control for substations; the development of the turbine, which has reduced the coal consumption from 7 to 8 lb. per kilowatt-hour to 2 lb. or less; the 60-cycle rotary converter, which has made it more practical to purchase power from central station companies rather than operate small generating plants in order to produce 25-cycle energy; the development of equipment for increased voltages, making transmission of energy over long distances more economical; the development of the commutating pole and ventilated type railway motor, which has resulted in a reduction of average maintenance cost from $3.50 to $5 per 1,000 motor-miles to 50 cents to $1 per 1,000 motor-miles; the production of multiple-unit control for train operation; the modernizing of air compressors and the introduction of automatic air brakes, with the striking development of the safety devices; and numerous labor-saving tools and machines for use in railway shops.

Mr. Andrews showed a comparison recently worked out to illustrate the reduction in investment cost made possible by modern motor design.

The following table is based on the sales of railway motors in this country by the two large electrical manufacturers for the year 1922. The upper figures represent the approximate number, weight and selling price of the motors actually sold; the lower figures are what a similar number of the heavier non-ventilated type of equal working capacity would have weighed and cost had the manufacturers remained idle for the previous ten years.

RAILWAY MOTOR SALES

Horse Power	No. Sold	Approximate Weight in Pounds	Approximate Price
25	3400	3,400,000	$2,550,000
35-45	3800	6,450,000	4,200,000
50	950	2,170,000	1,250,000
60-70	940	2,800,000	1,400,000
Total...	9090	14,820,000	$9,400,000
SAME VOLUME OF SALES WITH NON-VENTILATED MOTORS			
35	3400	6,800,000	$4,100,000
50	3800	10,500,000	[illegible],720,000
60-70	950	3,300,000	1,630,000
75-90	940	4,250,000	2,100,000
Total ...	9090	24,850,000	$13,550,000
Savings to operators		10,030,000	$4,150,000

These figures indicate that the economies obtained by the railway industry in one year directly due to motor development were measured by 10,030,000 lb. less weight to be carried on the rails and $4,150,000 less in investment. The annual saving from this would be about $600,000 in fixed charges and at least as much more in operating costs.

Discussing Mr. Andrews' paper, M. B. Lambert pointed out that the operators have in many cases also taken the initiative and have presented ideas which have formed the basis of fundamental developments, such, for example, as the low-floor, small-wheel car.

The work being done by the state committees and by the Indiana Committee on Public Utility Information in particular was presented in a paper by John C. Mellett, which appears elsewhere in this issue. This paper was discussed by Labert St. Clair, E. F. Kelley, Harry L. Brown, J. S. Bleecker and J. W. Colton. The importance of the right kind of publicity was emphasized and of the need for continuous, consistent effort in this direction. That the railways are taking this work up seriously was indicated by the report that 300 companies in the Central West are now advertising and that 170 of these are using purchased newspaper space for the purpose. The American Electric Railway Association is co-operating with the state committees, which are best able to handle this work locally, by supplying them regularly with information and statistics. There are now only fourteen states in the country which do not have committees actively working or in process of formation to broadcast utility facts.

The advantages to be derived from personal contact between railway executives and the communities which they serve, the ready medium for advertising offered by space in the cars, and the necessity for frequent changes of copy used for this purpose were also pointed out. It was shown that any form of advertising campaign should be carefully planned and consistently carried out by setting aside in the budget a definite appropriation for this purpose. The amount of this appropriation was discussed, it being pointed out that one company considered one-half of 1 per cent of the gross not too much. It was urged that a definite appropriation for publicity and advertising purposes should be made, even though it amounted to only one-tenth of 1 per cent of the gross, and that on such a basis effective work could be accomplished.

ENGINEERING COUNCIL SESSION

The Central Electric Railway Engineering Council was in charge of the Thursday afternoon session, with Frank R. Coates presiding. The work of the council was reviewed in a series of short papers covering the scope and advantages of this work, which were read by the directors of the four sections. Rufus Moses, Youngstown, Ohio, outlined the purpose of the council and said that it should devote its activities to the solution of immediate construction and maintenance problems, rather than to the preparation of technical papers or the development of standards, which should properly be left to the national bodies. A. V. Brown, Sandusky, Ohio, went into the necessity for proper support of this work on the part of the executives, emphasizing the desirability of their attendance at sessions of the council. L. A. Mitchell, Anderson, Ind., showed how the council benefited the railway industry by helping the mechanical department heads through the interchange of ideas and the co-operative study of maintenance problems and methods. This tends to hold the cost of such work to a minimum. The future of the council was treated by Charles L. Stiles, Columbus, Ohio, who contended that it depends on the support received from executives of member companies.

The reports of the committees on track and roadway, power supply and transmission, and car equipment were presented by the three chairmen, T. H. David, G. H. Kelsay, and P. V. C. See, respectively. The work of these committees of the Engineering Council consisted of a presentation of the conclusions developed out of discussions on certain specific maintenance and operating questions. These reports are printed on succeeding pages of this issue. M. B. Lambert and J. P. Barnes took exception, in the discussion of the car equipment report, to allowing more than $\frac{1}{8}$-in. wear on axle bearings. A suggestion was also made that the conclusions in the report on emergency stop tests be compiled in legal terms for use by member companies in defending damage suits.

The report of the committee on track and roadway was accepted as "suggested practice" by the convention; that of the power and transmission committee was accepted in so far as definite recommendations were made; and the report of the committee on car equipment was referred back to the committee for further consideration.

William P. Day, president International Steel Tie Company, made a brief talk on the importance of tamping concrete under the ties and rails in building modern permanent type track. His talk was illustrated with two motion picture films which showed how this tamping was done on several railway properties.

At the final meeting on Friday morning, a talk was made by C. A. Boddie on the use of wired wireless by electric railway and central station companies. This appears in abstract elsewhere in this issue.

The main topic of the Friday morning meeting was "Co-operation of Manufacturers," which was presented by E. F. Wickwire. This address was enthusiastically received and is printed practically in full elsewhere in this issue.

Building in the Public Mind the True Conception of the Railway*

The Chairman of the A. E. R. A. Committee on Co-operation of Manufacturers States in Humorous But Pointed Manner How Manufacturers and Railways Can Jointly Create a Powerful Influence that Will Change the Popular Misconception of the Railways and Stave Off Proposed Ill-Advised Legislation

BY E. F. WICKWIRE
Secretary Ohio Brass Company, Mansfield, Ohio

FIRST permit me to say that I think the man who invented conventions must have been troubled with insomnia. When I woke up this morning I looked in the next room and saw Jimmy Walker standing in front of the mirror with his eyes closed. I said, "What's the big idea, Jimmy?" He said, "Oh, I just want to see how I look when I'm asleep."

I might as well confess that I had very little sleep myself last night. So the first thing this morning I thought I'd take a little dip in the lake. When I got out on the beach a lady rushed up and said to me, "Excuse me, sir, but are you a lifeguard?" I said, "No, lady, I'm a wreck."

It won't take you long to discover that making speeches is not my specialty. In fact, when I come to Cedar Point I usually go out on the beach and practice my regular profession—astronomy, or gazing at the heavenly bodies.

We all know that for many years the general public was led to believe that electric railway companies were plutocratic; were coining money on a lot of watered stock, and that even 5 cents was too much for a ride on the trolley, no matter what the distance. In fact, the more people got in the way of trolley transportation the less they apparently expected to pay for it—just the reverse of what they demand in respect to other commodities.

We all realize that it's hard to deal with the public and get the true story across to it. It don't seem inclined to recognize the fact that it's probably more difficult to approach 100 per cent service in the electric railway business than in any other industry and it makes no allowance for that fact.

And lack of recognition often leads to serious results. For instance, you all remember the night the amendment went into effect. And the night after, when you went home sober and your dog bit you.

In short, it became evident to all of us a long time ago that the public needs more light on the subject, as the fellow said who took a lamp when he went courting. He met a friend who laughed at him and said, "Why, I never took a lamp when I went courting." The other fellow said, "No, and just see what you got."

Legislation directed against public utilities has won hearty applause from a large percentage of unthinking people who have not realized that their own welfare is connected with the fortunes of the very enterprises they are attacking.

A man will buy a house on the installment plan, paying so much a month. And in two years his payments will be just about one lap ahead of his depreciation. Yet the same man seems to think that every dollar a public utility takes in is profit.

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*Address made before Central Electric Railway Association at Cedar Point, Ohio, July 20, practically in full.

So the trolley companies long ago recognized the importance of getting the true facts of the electric railway situation across to that man, and some very excellent work has been done by the trolleys along that line. Unfortunately, however, a great many people are still suspicious of public utilities and are disposed to discount statements and articles put out directly by the utilities, especially in the form of paid advertising. And, as Northcliffe once said, "You can't disarm the nations until you have disarmed suspicion."

I'm driving at the psychology of this proposition. How many of you in this meeting would think of standing up and attempting to set forth your own virtues and expect to get away with it? But you might not hesitate to get up and extol the merits of your friend next to you, and the chances are the rest of us would believe you, especially if we didn't know him better than you did.

About two years ago the American Electric Railway Association realized the significance of this psychological fact and also the fact that to educate the public effectively required a still broader and more comprehensive effort than had been put forth.

Unless the educational work is done thoroughly there is danger of the public becoming somewhat confused, like the Irishman who was visiting his friend in America. Pat saw some cranberries for the first time. "Whut's thim?" "Cranberries," answered Mike. "And whut are they for?" "Why," says Mike, "they're foine to eat. When they're cooked right they make better apple sauce than prunes do."

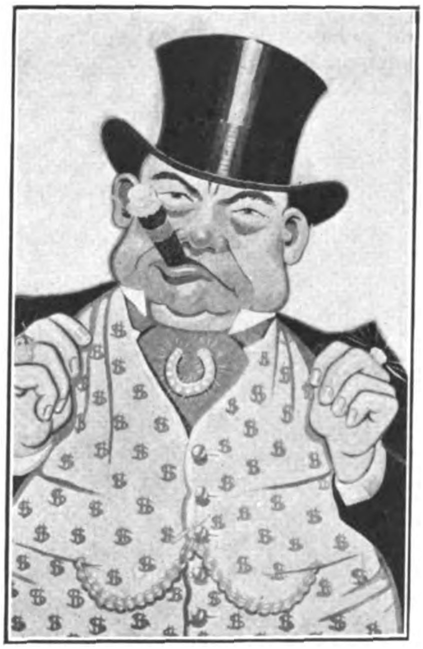
The association awoke to a greater realization of the fact that electric railways have occasion to buy products of a great many manufacturers. It therefore follows that the prosperity of these manufacturers is closely linked with the welfare of the electric railway industry. So they decided to promote the idea of a closer relationship with the manufacturers, on the theory that two bodies which do not quite present the desired impression when standing apart, oftentimes harmonize when joined together.

Like the fellow and girl I saw on the beach this morning. He was very bow-legged and she was extremely knock-kneed. And yet, when standing together, they formed a perfect "O.K."

So the A.E.R.A. started a movement to enlist the active support of the manufacturers, and to that end appointed a committee to organize and direct the work, which I think is a pretty good committee, making allowance for the fact that it is burdened with me as its chairman.

Our committee was organized at the beginning of 1922, and its aim, in a nutshell, was to enlist the active co-operation of manufacturers in a comprehensive effort to improve the relations of the electric railway industry and the public.

One of the first and most important moves of the committee was to arouse the interest and active support of the vast army of employees and stockholders of manufacturers identified with the industry. And that was a problem of education. Strange as it may seem, very few of this influential section of the public realized that they had a dollars and cents interest in the welfare of the trolleys. Practically no effort has been made to educate them along this line, and yet there were many ready-to-use avenues open through which this education could readily be carried on.



The Conception of "Mr. Electric Railway" Held by the Average Person, According to Mr. Wickwire

For instance, many of the manufacturers have factory publications and house organs, which reach all their employees. Bulletin boards are available in every factory connected with the industry. Meetings of factory foremen and employees are open for presentation of helpful and instructive talks. Stockholders are readily accessible through manufacturers' lists.

And yet these and many other channels through which the hundreds of thousands of manufacturers, employees and stockholders could be reached and profoundly impressed had never been utilized to any extent until our committee was organized.

At first our committee sent to the manufacturers printed matter which was so prepared that it could be modified to suit local conditions. The idea was that each manufacturer could pick out the portion which best suited his requirements and then put it out in the most effective form.

However, we soon learned by experience that we had to send out our ammunition in cartridge form—all ready to fire. In other words, we had to furnish material all canned and ready for use, so that the manufacturer would only need to apply a can opener and use the contents. In some cases we even had to furnish the can opener. We felt something like the young married man who went home one evening and asked his wife what they were having for dinner. "Well," she said, "Dearie, I'm afraid we'll have to go downtown to eat, I've lost the can opener."

Even when it came to following directions, we found some of the manufacturers a little absentminded. Like Bill Fincher at breakfast this morning. Bill was so absentminded that he poured the cream on his head and scratched his berries.

The work of our committee has been going on now about a year and a half and during that time we have been greatly encouraged by the interest and active co-operation displayed by a large number of manufacturers identified with the industry.

(At this point in his talk Mr. Wickwire called detail attention to an exhibit of samples of the co-operative work that is being done by the manufacturers. Included in this was a printed "Honor Roll" of those manufacturers who have taken part in this work.)

We feel quite sure that most manufacturers identified with the industry will take an active part in this movement as soon as they get a real understanding of the importance of the work and the value of their help. Of course, in every constructive movement of this kind there are always a few who take the attitude of the fellow who always grabs the stool when there is a piano to be moved. You gentlemen can help us with the manufacturer who is indifferent to the importance of this work and who is not participating. It has been said that an army fights on its stomach. But it moves on its feet. And if these manufacturers expect you railway men to keep their stomachs filled with business, why shouldn't you insist that they get to their feet and join this movement.

Now, having given you a little idea of what has been accomplished under the direction of our committee, I would like briefly to give you an outline of a further plan that we are working upon right now.

Based upon the committee's experience and observations in connection with this work, we have concluded that one of the outstanding aspects of the present electric railway situation is the mental picture of "Mister Electric Railway" which the average citizen carries around between his false teeth and his toupee. We have found evidence of the fact that a great many people are still carrying around in the back of their craniums a mental picture of Mister Street Railway as a plutocrat, with a fat tummy and a fat pocketbook.

As an indication of that fact, I have something here to show you. A.E.R.A. headquarters asked an artist to paint his conception of Mister Electric Railway—he was not given detailed instructions—look what he turned out!

It's a ridiculous conception of the real Mister Electric Railway, of course, but there are too many people who are still carrying around some such mental pictures as this of him. And furthermore, they seem to think that the process of dropping a nickel into a fare box changes it into a dollar bill and that the dollar bill goes solely to upholster the fat body of the fat man with the fat pocketbook.

Now, contrast that atrocity with another work of the same artist. This time he was interpreting his conception of Mister Bus Owner. And here is the result.

In other words, the man in the street —or the man in the cellar, if you wish— thinks of Mister Electric Railway as a pampered son of Paradise, while he considers Mister Bus Owner as a regular guy—a human being whom he can understand and sympathize with and help along in the world.

That seems to be one of the deep-rooted prejudices that we've got to dig out and overcome. And in order to get the result that we're after, it seems to me that we've got to get right down to a basis of plain talk to the plain people—something they can understand and which appeals to them—like the Greek restaurant keeper who has no bill-of-fare, but lets his patrons order direct from the table cloth.

I'll admit that it's not an easy job to offset the work of the radical element, which has poisoned the public mind to such an extent that some people actually think that public utilities are organized with the sole aim of robbing the public.

A chap went into a music store and asked to look at a harp, a guitar, and a lyre. The clerk said, "I can show you the harp, and the guitar, but the boss is out to lunch."

The radical agitator is not particular whether he plays on the harp, the guitar, or the lyre, so long as he strikes a chord that hypnotizes the masses. To combat this, we must combine all the present loose ends of the industry into one powerful unit. Then, if we keep pumping the facts into the public from all sides, it will gradually absorb the truth.

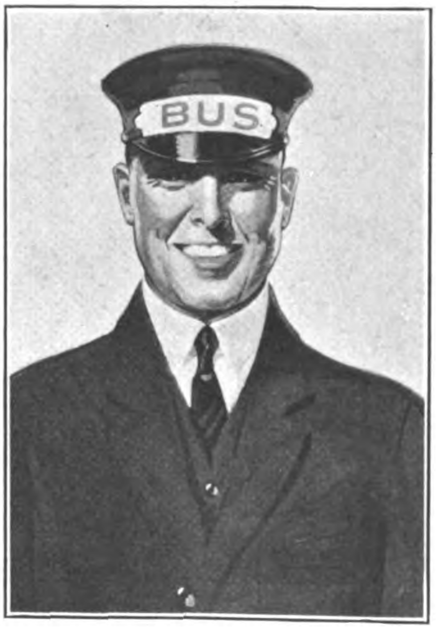
The brain cells of the most stupid person are always in action. Cerebration goes on whether they will it or not. A soft brick placed in water will absorb a quart if left a few days. A human brick will likewise absorb a bit of knowledge if it is soaked into him long enough.

Why is it that a man who wouldn't think of trying to cheat a jitney driver will brag about "slipping one over" on the electric railway company? Why is it that a man will make a joke out of it if a motor bus limps along half an hour late and "bawls out" the traction company if an electric car happens to be five minutes off schedule?

The other day a street car was standing peacefully on its own track when along came an automobile and tried to enter the car without paying. Why did the newspaper come out that night with a headline reading, "Street Car Hits Automobile."

Why is it that in many places the public officials, who are always imposing special taxation, regulation and other burdens upon the traction companies, turn right around and donate terminal facilities and other favors to the bus lines?

I know of at least one place where the county officials have actually turned over to the bus lines a part of the county court house, with its comfort station, for a waiting room. In other words, they encourage the bus lines by calmly appropriating for their use public property, maintained by the taxpayers. What do you think these public officials would say if the electric railways attempted to avail themselves of the free use of this same waiting room? In other words, why should some public officials do so much to encourage the bus lines and do everything possible to discourage the electric railways?



By Contrast, This Is the Popular Conception of "Mr. Bus Owner"

The other day a citizen of the community referred to parked his car at the court house and went in to pay his taxes. When he came out he found that he had been pinched for parking in the "private preserves" of the bus lines. Can you beat that?

Why is it that the public complacently accepts such things as a matter of course? Perhaps the "Minute Men" are increasing in the country; you know, "one born every minute."

I heard of another place where the street railway, by the terms of its franchise, is compelled to maintain frequent service eighteen hours of the day to a certain factory district. This means operating the cars most of the time at a loss. During the off hours of traffic the cars run light, of course, and in the busy hours "wildcat" buses back up to the factory doors, not only to skim the cream off the city tariff, but also to steal the business of the interurbans, which are compelled by ordinance to maintain waiting rooms.

In other words, the public officials insist on the railway company feeding and housing the "transportation cow," but they give the buses equal milking rights.

Can you imagine a traction line which provides service only during the busy and profitable hours of the day?

Can you imagine jitney or bus lines being compelled by ordinance to provide service eighteen hours a day, in off hours as well as rush hours? Any council would laugh at such a supposition.

What's the answer to such discrimination?

Isn't it because public officials have reason to believe that public sentiment approves this scheme of things?

And, going still deeper into the cause, isn't it largely because too many men are carrying around this false mental plutocratic picture of Mister Electric Railway?

That being the case, why not strip this counterfeit plutocratic garb from the electric railway industry and let it appear in its true garb of overalls! The public at large seems to have a sympathetic fondness for the man in overalls. The "people's choice" seems to cater strongly to and has a wholesome fear and respect for the vote in overalls.

Therefore, why let them overlook the fact that the electric railway business is essentially an industry in overalls? We know that the picture of the fat man is not a true likeness of the man who prospers as the electric railways prosper.

Here is the real personification of the electric railway industry (page 141).

He represents more than half a million laboring men—motormen, conductors, linemen, shopmen, trackmen, factory workers, who depend for their living upon the success of our industry. We want to awaken in the public mind a spirit of sympathetic understanding for this man. We want the public to respect him and his rights. And, above all, we want to arouse *him* to a realization of the fact that it is to his interest to stand up and fight for the industry—*his* industry—upon which he depends for his livelihood.

Now it is one thing to outline the result to be obtained and it is quite another to point out how to go about getting the result. I want to submit to you a plan our committee has hit upon to help create a mental picture of the electric railway industry as a man in overalls.

Some photographs of real workmen, who are a part of the electric railway business, have been taken and printed in car poster form for the use of the electric railways. One pictures Martin Donnelley, one of 77,000 motormen, not to mention 63,000 conductors. Another shows Adam Stillwagon, who has been working on the track for eighteen years. Dan Leonard, who has been a lineman since he was a youngster, is the subject of another poster, and so on. This group of railway wage earners totals close to the 300,000 mark. Another poster shows Bill Ernst, who has been making electric railway supplies for fifteen years—a representative of a group which numbers untold thousands.

There is a vast army of workers like these, all dependent upon the welfare of the industry for their livelihood, and our plan is to put out in poster form these actual photographs of men in overalls identified with the industry.

Imagine thousands of these posters broadcasted through the country, displayed in street cars and plastered on factory bulletin boards, showing the workingman as an integral part of the electric railway industry. Surely such pictures as these will begin to take the place of the inaccurate portrait of the plutocrat which is now hanging in too many cranial galleries, and I think you will agree that there is likely to be a favorable reaction on the part of the public.

That sort of thing should go a long way toward convincing the plain people that when they throw mud at the trolleys they are really besmirching their own fellow workers — brother members of their own lodge. And once we get the public feeling that way about it, we will have the statesmen of the "cobblestone" wards on our side too.

When the voters really begin to show a friendly disposition toward anything, their chosen representatives respond as quickly as a seal when there is fish in the air. They have to. They know that if they don't their erstwhile constituents will be saying, "Yes, old Mike was a good office holder, as office holders go—and as office holders go, he has went."

However, our committee realizes that it is not enough to run a few thousand posters through the press and put them in the mail. They must be displayed widely, thoroughly and intensively. There are good places waiting for thousands and thousands of them, where they will be seen and understood and where they will help accomplish what we are after. This plan needs to be put across in a big way in order to create the kind of impression that we are after and everybody connected with the industry should realize that his help is needed to make the plan a success.

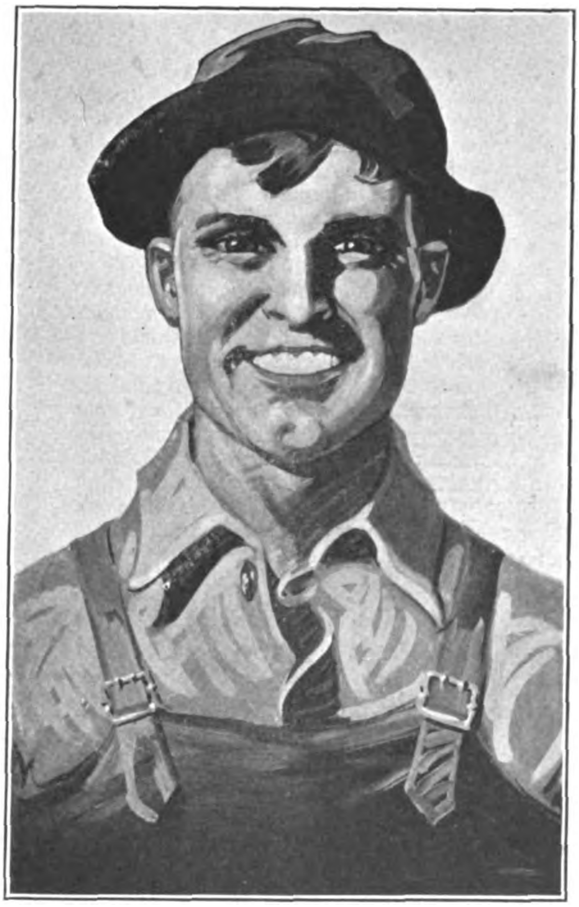
Now I would like to mention the fact that this important work has been carried on by a voluntary committee, with the part-time assistance of Labert St. Clair, publicity director of the American Electric Railway Association. In spite of the other demands upon Mr. St. Clair's time, he has given us very able co-operation and enabled us to do some very effective work.

However, I believe that we have gone far enough to show that the work is much too broad and too valuable to be left to the direction of a voluntary committee, composed of men who must give most of their time to their personal business affairs.

In short, it seems quite evident that this whole movement should be handled like any other big enterprise, if it is to reach its full measure of success.

It is important enough and productive enough to justify the entire time of a capable director with a competent staff —men who can devote their whole energies to the organization and direction of the work.

Please don't overlook the fact that, in addition to the educational activities of such an organization, a truly tremendous force could be brought into play and utilized in connection with legislative matters affecting the industry. A capable director and his staff of office and field men could card index the organization as it was built up and they could mobilize its full strength and throw it into the fight as a powerful unit whenever occasion demanded.



But the Man in Overalls, Some 300,000 Strong, a Cheerful Public Servant, Is the True Personification of "Mr. Electric Railway"

Take the automobile club plan of organization, for instance. In Ohio we have something like seventy local clubs affiliated with state and national associations. That means that the membership of the local clubs combines to make up the membership of the state and national association.

When a legislative matter at Washington is to be influenced one way or the other, the full strength of every club is drawn into the fight.

When action is needed at the state Capitol, all the affiliated clubs in the state respond as a unit. And when 80,000 votes speak together, with one voice, the people's choice listens and most generally acts.

A municipal matter is, of course, handled by the local club.

In other words, the same machinery is used, as required, for local, state and national legislative matters. As a matter of fact, the automobile organization has made itself so profoundly felt that legislators are always casting about to find some way to please it.

For instance, two Western states this past year have enacted laws to compel night-driven herds on the highways to be equipped with tail lights. This is an excellent idea, but I think it would be better to compel pedestrians to be equipped with reflectors—a red light for females under thirty, a violet light for grass widows and a green light for old maids. In that way a lonely motorist could tell at a glance just who to run over and who to pick up.

Now just stop and imagine that the full strength of our industry would be combining the railways, with their employees, and the manufacturers, with their army of workers. Properly organized, under adequate competent direction, think what a powerful central station could be created, with its network of communication lines flung the length and breadth of the land. Surely there would be energy enough available to get a square deal and reasonable regulation for the public utilities then!

But we must get in the right condition for it. I met a railway man the other day coming out of a chiropractor's office, and I said to him, "What are those chiropractors, anyway?" And he said, "Why they knead your spine — your backbone." And I said to him, "Well, I need my backbone myself; and our whole industry needs a stiff backbone. And every man connected with it should become imbued with a fighting spirit, so that he will be ready to fight a whole regiment single-handed, if need be. Like an Irishman over in the fighting zone of Ireland, watching an Orange parade that was passing. He watched for a minute or two and growled, "Begorra, they wouldn't dare to pass Chistnut and Cork Streets four years ago." And as more went by he muttered, "Yis, and bejabers they wouldn't dare pass by Clancy's saloon two years ago." He glared a little longer, went into Clancy's for a drink, came out and with rising wrath shouted, "Yis, an' there hadn't many more of thim better pass by here right now."

Possibilities from Interurban Freight*

Best Future of Electric Lines Is in Handling Freight—Main Handicap Has Been Lack of Adequate Equipment and Terminal and Station Facilities—500 Additional Box Cars Could Be Profitably Utilized in C. E. R. A. Territory

By T. H. Stoffel
Railway Department, Westinghouse Electric & Manufacturing Company

SERIOUS reductions in the income of the interurban railways have resulted from the use, by the riding public, of the passenger motor vehicle. It is generally conceded that there is no way permanently to overcome this condition, but that still further reductions may be expected, due to the ever-increasing number of automobiles on the highways. It is questionable whether the present tendency to effect economies in passenger operation, through the use of lighter weight cars, etc., is more than a temporary solution of the problem.

With these conditions in mind it naturally follows, therefore, that if interurban railways expect to continue to live, some means must be found to augment their depleted incomes to such an extent as will enable them to again build up the properties to a high standard of maintenance, demonstrate their earning capacity, and make investment in their securities attractive to capital.

The most logical and the surest means of accomplishing this is through the development of freight business. Existing operating facilities, including roadway, track, power plant, etc., are idle a large part of the time, or are employed to the extent of only a fraction of their capacity. Much tonnage can be hauled at night and during these idle periods and off-peak hours, thus making unnecessary any further investment in power facilities, and at the same time utilizing this idle equipment in revenue-producing service. The cost of providing adequate terminals, motive power and rolling stock, also a competent traffic organization, which are other essential requirements for conducting a successful freight business, is comparatively small.

It is true that more or less freight is being handled by a considerable number of electric lines, but it is also true that, in the past, the managements generally have given but little attention or encouragement to this phase of operation. Such service as is being provided is largely the result of insistent demand on the part of shippers, and as a general rule no consistent efforts have been made to conduct the business economically or along progressive lines, notwithstanding this branch of service is a proved source of net income.

The general lack of transportation facilities is today the principal factor limiting industrial development and trade, and the situation has become so acute that many national associations and civic bodies, including the United States Chamber of Commerce, have undertaken investigations and studies at considerable expense, to determine if possible what can be done to improve existing transportation facilities and methods, and to provide more adequate means of taking care of the constantly increasing requirements.

A study of the electric railways of the country shows conclusively that they afford a definite and existing means of relieving the situation, and that they can, if they will, make for themselves an important and permanent place in the general transportation scheme of the country, with much financial benefit to themselves. There is no tenable reason, for example, why a co-ordination of transportation facilities should not obtain, which would provide that electric railways should handle all freight between terminal and jobbing centers for destinations common with the steam roads, thus relieving facilities of the latter for the more remunerative and longer haul tonnage.

Transportation authorities have presented figures which show that short-haul, and especially less-than-carload traffic, say for distances up to 75 or 100 miles, cannot be handled by steam lines except at a loss, on account of the necessarily large overhead expense involved in providing extensive terminals, trackage, etc., suitable for heavy long-haul traffic. The electric line can handle such tonnage more economically and at a profit, by reason of its more flexible and lighter equipment, smaller terminals and much lower overhead.

NET EARNINGS ON FREIGHT INVESTMENT

That the handling of freight is a very profitable source of income for electric railways needs no proof other than the results obtained by lines now engaged in this branch of service, notwithstanding that as a general rule rolling stock, motive power and other facilities are wholly inadequate and often not suitable. Only a few electric lines have undertaken to separate freight income and operating costs from those of other branches of operation, and therefore the majority do not fully realize the extent of the net returns from freight business.

It may be truthfully stated, however, that net earnings of from 15 to 40 per cent on the freight investment may be expected, depending on the location of the line, the class of tonnage available, the methods and efficiency in handling and the facilities provided. As an example, one line which a few years ago undertook consistently and intelligently to develop its freight possibilities received a gross revenue in 1922 of approximately $390,000 and enjoyed a net profit of over 27 per cent on a freight investment of $320,000, or equal to 7 per cent on an investment of over $1,250,000. In allocating operating expenses on this line everything which could properly be assessed against freight income was so charged, including interest, depreciation and taxes. Another line has developed its freight service to the extent that 75 per cent of the gross revenue is derived from this source.

The vast industrial territory comprising the states of Indiana, Ohio and Michigan, traversed by a network of some 5,000 miles of electric lines included in the membership of the Central Electric Railway Association. without question produces the greatest volume of tonnage of any district in the United States, of the class which can be readily handled by the average interurban road, and for which such roads are especially adapted. The amount of such tonnage available is almost unlimited, in both carload and less then carload quantities.

While practically all of the lines in this territory are offering freight or express service to some extent, the surface of possibilities has hardly been scratched. With few exceptions no consistent efforts have been made to develop the traffic; terminal facilities are wholly inadequate and congested, resulting in excessive station labor costs and delays and expense to shippers; team tracks and sidings for carload loading and unloading are almost unknown; motive power is of small capacity, making necessary the operation of many small train units, with consequent excessive train labor and power costs; and the shortage of trail cars of various types is very acute. Solicitation with present facilities is hardly necessary and it is found difficult, by reason of the shortage of rolling stock, to take care of even the merchandise tonnage which is practically forced upon them. Many lines are confining their efforts to the handling of less than carload tonnage on account of this lack of equipment, with the idea of providing maximum service to the greatest number, and make no attempt to handle carload and more remunerative business.

NEED FOR 500 ADDITIONAL TRAIL BOX CARS

The most urgent and immediate need of the lines in the Central Electric Railway Association territory today is trail box cars. It is believed that 500 additional cars of this type would be absorbed in the service at once, and without effort to find loading for them. Three or four times that many would ultimately be required under consistent development. One result of this shortage of rolling stock is the tendency to load present cars beyond their capacity. This is not only dangerous, but increases equipment maintenance costs and causes loss in revenue while cars are out of service for repairs, and is a practice which should be regulated.

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*Abstract of paper presented before the Central Electric Railway Association, Cedar Point, Ohio, July 18.

There is an ever-increasing amount of interline tonnage available, the movement of which is now limited by the number of trail cars which can be spared from local service. In many instances when cars are permitted to run through to destinations on other lines, there are frequent and sometimes serious delays in returning them to the owners. In view of these facts and also due to the general pressing need for additional rolling stock, it is believed that in the purchase of new cars some scheme of common ownership should be worked out which would make it possible for all lines to have a supply of cars for both local and through loading at all times.

Along these lines it has been suggested that the electric lines in the group represented by the Central Electric Railway Association form a Car Trust Association, each member road of such association to delegate a representative, and the group of representatives to form a car trust committee, which would have power to purchase cars on the car trust plan. Financial standing should be given this committee by underwritings of the member roads; the individual amounts of such guarantees to be based proportionately on a certain number of cars to be allotted to each line for inventory purposes, the car trust member lines to pay the car trust committee a fixed per diem charge with a minimum guarantee; the per diem and minimum to be of such amount as to enable the car trust committee to pay certificates as they become due. If it should happen that any of the cars are idle during slack periods or for any other reason, the per diem charge should be prorated on a basis of the original allotment. Under this plan each member road would carry an adequate supply of parts for repairs, and M. C. B. inspection at transfer points would govern responsibility for damage or mechanical defects.

The principal advantage of such a plan for the purchase of rolling stock lies in the fact that cars will be available for use on any line in the territory, and the necessity for prompt return is to some extent eliminated, which in many instances would permit of use for other loading, thereby reducing empty car mileage. Another advantage is that if there was a falling off of available tonnage on any certain line or in any particular district, cars could be assigned to roads having loading, keeping them continually in service.

Before purchasing cars under this plan it would be advisable for all interested roads to develop and decide upon a standard type of interurban freight car, suitable for operation on all lines. This car should not be longer than 40 ft. inside measurement, and should be equipped with M. C. B. radial draft rigging and automatic air brakes. No doubt a much lower price per car could be obtained from manufacturers for such a standard car if purchased in quantities.

Another outstanding and serious disadvantage to the proper development of freight traffic is the lack of adequate station and terminal facilities, including team tracks and sidings. At practically every terminal of any size, shippers' conveyances are delayed, sometimes for several hours, to unload shipments at the platform. These delays, to say the least, are costly to patrons and as a result many shippers take advantage of electric line service only to non-competitive destinations, and often resort to the use of the more expensive motor vehicle in their desire to satisfy customers, when as a matter of fact the interests of all would be better served by the electric line.

There is a large amount of carload tonnage which might be handled, but the failure to provide terminal team tracks and convenient sidings in the rural districts, together with the shortage of cars, prevents the securing of this very desirable traffic. While carload rates as a general rule are lower than the merchandise rates, the labor expense of loading and unloading is avoided and net earnings per car in many cases amount to more than when loaded with the higher class merchandise. With suitable terminal team tracks it is also frequently possible to load solid cars of merchandise for certain destinations, direct from dray to car, thus relieving congestion in the warehouse and materially reducing handling expense.

Another matter worthy of serious consideration is the possibility of materially reducing train operating costs. The greatest items of expense in freight handling are station and train labor. Due to the large number of small capacity motor cars in freight service, a great many trains of from two to four cars each are operated over the same line daily. Both train labor and power costs can be materially reduced through the use of motive power able to haul longer trains. Motor equipment capable of handling trains of from six to fifteen cars, known as the low-speed, field-control motor, has been designed by manufacturers especially for interurban line freight service. A distinct advantage in the use of this type of motive power is that trains of ten or more cars can be handled with no greater power consumption than for a single high-speed passenger car and therefore the possibility of overloading substations is practically nil.

The handling of long trains may be deemed impossible on account of restrictions imposed by certain communities through which trains must pass, but it has been found that as a general rule the public and the authorities are inclined to be reasonable and will withdraw their objections if fully informed as to the necessities and advantages of such operation, or if they can be made to feel that advantage is not being taken of them.

CARLOAD BUSINESS VERY DESIRABLE

What can be done in the way of securing and handling carload freight, under well directed and systematic effort, is emphasized by what has been accomplished in handling live stock by the lines reaching Indianapolis. Information at hand indicates that during the past year electric lines transported approximately 8,500 carloads of livestock in and out of the Indianapolis stock yard, or about 35 per cent of the total business of that yard. One of these lines also demonstrated its efficiency and capability by handling over 1,500 carloads of cement within a few months, and with such satisfaction that the manufacturer felt justified in making a considerable expenditure to increase the capacity of his plant with the idea of reaching out for other markets having electric line freight service.

The same line has also developed and expedited perishable freight service and is hauling trains of from four to seven or eight cars of fruit and vegetables daily during the season. This service provides for shipment late in the evening and insures delivery at the terminal before three o'clock in the morning, in time to be disposed of before business hours, and is exceedingly popular with shippers and profitable to the carrier.

There has been a general understanding that steam roads were unwilling to join with electric lines in through traffic arrangements. No doubt some foundation exists for this, but it is evident that steam roads are beginning to realize that co-operation and co-ordination with electric lines is not only feasible, but is mutually advantageous. As a matter of fact, practically all interurban lines located west of the Missouri River have been able to secure joint through-traffic arrangements with steam roads, and as a general rule are parties to steam line tariffs, including trans-continental. Recently, too, a number of electric lines in the East have completed similar arrangements; in fact I believe one of the lines, a member of this association, has successfully concluded negotiations, opening to it steam line territory extending from St. Louis and Chicago to Buffalo. One of the Ohio lines, also, has joint tariffs and divisions with steam lines between Chicago and Buffalo and intermediate points, and stations on its line. In both instances the prospects are bright for a still further extension of territory.

There are many other ways and methods open to electric lines for developing freight tonnage, such, for example, as locating industries on the line, building sidings to established industries, finding markets for products of the farm, etc., but after all any program of development is useless unless the tonnage can be handled expeditiously and facilities and equipment for doing so are available. It is practically impossible to estimate the amount of tonnage which might be secured under intelligent direction and consistent development. It is the experience of electric lines generally, and especially in the C.E.R.A. territory, that whenever facilities for handling have been provided, tonnage was available.

The statement was recently made by a large shipper in C.E.R.A. territory, that the use of electric lines in the forwarding of his shipments had enabled him to triple his business in three states within a short time, and that trial shipments made by him for distances up to 250 miles, indicated that the service of electric railways was from three to ten days better than either the steam roads or the American Railway Express. At that time this concern desired to load from six to eight trap cars per day for various junction points, for distribution, if cars could be furnished. Another shipper who has practically discontinued the use of electric lines in his shipments because of the lack of facilities and equipment would load four trap cars per day, if rolling stock could be furnished regularly and a place for loading provided. Any number of similar instances could be cited.

Work of Indiana Information Committee*

By John C. Mellett

Director Indiana Committee on Public Utility Information

"UTILITY Information Work," the subject of this discussion, may not mean a great deal. I shall therefore introduce the subject with a text, taken from the last of the prophets, Abe Martin. He says, "The feller that don't advertise may know his business; but nobuddy else does." If anybody present does not like that text, he may use this one, offered by a writer in that big book the Gideons are pushing. The Gideons do a good deal of business with the tractions, and some of you may prefer to reciprocate and follow a text from their book. Here it is: "Let your light so shine before men that they may see your good works." That is the advice of Matthew, seconded by the Gideons.

We in Indiana like our own prophet and his suggestion with regard to advertising, but we also try to follow Matthew. We have been doing it, in the utility business in our state, for more than three years. The Indiana Committee on Public Utility Information was organized in January, 1920, in order to let the good works of Indiana's gas, traction, electric, telephone and water utilities shine before men, so that the state might see their good works; and, if I may say so, in order that the light might continue to shine.

For the Indiana committee, like a good many other healthy youngsters of this day and age, was born of necessity. War conditions brought Indiana utility operators to the realization that they had to tell the people about their business. They should have realized it sooner, but they are entitled to credit for seeing their need before the operators of most other states had opened their eyes. Only Illinois preceded Indiana in organizing and maintaining such a committee.

In Indiana during the war the utilities, tractions first of all, were called upon to be patriotic and self-sacrificing while many unregulated businesses profited and some profiteered. Under regulation they were held down until the rising waves of production costs threatened to drown most of them. The theory and promise of state regulation was that after the war the utilities would be permitted to increase their rates and re-establish themselves on the firm footing to which they were entitled. But the war ended, and the public demanded lower prices. In Indiana the public knew nothing of any patriotic starvation suffered by the utilities, and when it began demanding lower prices, it included requests for lower prices on all utility services. Utilities appealing to regulation therefore found regulation, for the time being, helpless in the face of public opinion.

In a word, the utilities were holding the bag, which is a worse job in business than in snipe hunting. It was decided that advertising and publicity must be used extensively to build up the utility case before the public. Utility men in our state were confident that, once the facts were presented, the people would permit justice to be done the utilities and their owners. Therefore they organized the state committee, and set to work.

We started at once the publication of a small weekly paper, for distribution among newspaper editors, city and state officials, libraries, schools and colleges, and women's clubs. We arranged to provide speakers to discuss utility problems before all kinds of meetings, and undertook to educate backward utility operators in the merits and benefits of advertising and publicity.

At first, our work dealt with the subject of rates, more than anything else. The immediate task was to show the people of Indiana that the utilities, though vital to comfort and prosperity, had been mistreated. With this in mind we emphasized increases in the cost of producing traction, gas, electric, telephone and water services. We showed how these increases were still, at that time, growing, while rates had in the main stood still. By hammering these points day and night, we managed so to educate the people of the state that regulation was able to grant increases in rates. We have kept up this program, with the result that Indiana utilities are generally in good condition now.

Having tasted the fruits of publicity and advertising, Indiana utilities found them good. We have therefore gone into other problems as well as rates. We have worked to educate the people in the fundamentals of the utility business, treating such subjects as valuation, turnover of capital, the fair return, and so on. Within the last eighteen months our committee has met and fended off the threat of abolishment of state regulation—chiefly by means of widespread publicity showing the benefits of and necessity for state regulation. And just now we are working on the subject of taxes, in the hope of escaping a slow, lingering death from acute or malignant taxation.

Indiana utilities have learned that they can exert a much greater influence in protecting themselves against misunderstanding, ignorance and politics when they are compactly organized than they can when they are not organized. In years past, Indiana utilities operated each for itself, "and the devil take the hindmost," with the result that he took not only the hindmost but several others as well. The cost of co-operation has been so small as to be almost negligible to the individual companies, but the results have been large. Our assessment against member companies is only one-fiftieth of 1 per cent of gross receipts, but most of the members would multiply their contribution by several times before they would give up the educational program we have undertaken.

In the main, the committee endeavors to restrict its efforts to problems that are general to all the utilities. But last year we made an exception and rendered some service to the tractions by helping them convince the public that unrestricted, unregulated motor bus and jitney operation is unfair and dangerous. The fight on this point is not yet won, but it is coming our way. We convinced everybody in Indiana, last year, that the jitneys and buses should be regulated—except their operators and the Legislature. We have no hope of convincing the jitney and bus men, but we do expect to convince the Legislature by our own efforts and the efforts of the public, which is for us, thanks to publicity and advertising efforts.

So much for co-operative work in behalf of the utility industry. Our committee has done one other thing, to the everlasting good of the business. It has preached for three years the importance of maintaining friendly relations with the newspapers. The committee has worked on the state as a whole. Individual operators have been asked to keep in touch with their local newspaper men, and they have been doing so more consistently than ever before. I do not mean by this that they have been hanging around upon the editor's coat tails. They have simply made it a point, when anything was in controversy, to see that each editor knew the facts in the case, and that he conveyed these facts to his readers, either through publicity, news or advertising. The result has been a fairer public opinion throughout the state.

Indiana's committee has worked hand in hand with Illinois, Ohio, Michigan, Kentucky and a score of other states where the utility executives took up this program. We hold no brief for the others, but in our state the operators are glad they have been letting their light shine before men, according to Matthew's advice. And in keeping with the spirit of Abe Martin's axiom, since the utilities have been advertising, the state knows more about the utility business than it ever did before. Which is a good thing for both the public and the utilities.

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*Abstract of paper presented before Central Electric Railway Association at Cedar Point, Ohio, July 19.

Emergency Stop Tests

C. E. R. A. Special Committee Reports on Distance to Stop City and Interurban Cars With Air and Electric Braking

A SERIES of braking tests on several types of cars was made during the week beginning May 13 under the auspices of a special committee of the Central Electric Railway Association consisting of S. W. Greenland, chairman; S. D. Hutchins, H. C. DeCamp, C. A. Brown, G. K. Jeffries and D. D. Ewing. These tests were described briefly in ELECTRIC RAILWAY JOURNAL for June 2, page 933. Emergency stop tests were made on: (a) Interurban car, double truck, four motors. (b) City car, double truck, four motors. (c) City car, double truck, two motors. (d) Birney safety car.

CONCLUSIONS

As the result of a careful analysis of the test data, the following conclusions were reached:

1. There is no one best way to stop any car in an emergency. In general, the best way will depend somewhat on the type of brake and motor equipment.

2. As a broad rule, subject to occasional exceptions, it may be said that the best way to stop a car equipped with air brakes is to apply emergency air and sand simultaneously throwing the controller to the off position.

3. The electrical methods of braking, reversed motors and bucking motors, subject the equipment to very severe strains. Because of the abruptness with which the braking force is applied, the value of these methods in emergency braking is more apparent than real, except in those cases in which the air brakes from some cause are inoperative.

4. Of the two electrical methods, reversed motors and bucking motors, the reversed motors method is the most effective.

5. If the motors are reversed in conjunction with emergency air and sand, skidding invariably results, and even under good rail conditions, the results are not superior to those obtained using air alone.

6. The electric braking methods are more likely to produce erratic results than the emergency air, and for this reason should not be resorted to as a general practice.

7. Because the rail conditions under which these tests were made were better than those ordinarily obtaining on city streets, the results should be regarded as minimums rather than averages or maximums.

8. The best way to stop a Birney safety car in an emergency is for the motorman to raise his hand from the controller handle.

A brief summary of the details of the four cars tested is given in the accompanying table. The test track selected was on the Lebanon-Crawfordsville branch of the Terre Haute, Indianapolis & Eastern Traction Company, and consisted of a stretch of level tangent track about 1 mile in length just west of Pettigrew substation. During the first two days of the test, the weather was unsettled and the track was wet at times. Mostly, however, the rails were dry and in excellent condition for braking tests.

DETAILS OF THE TESTS

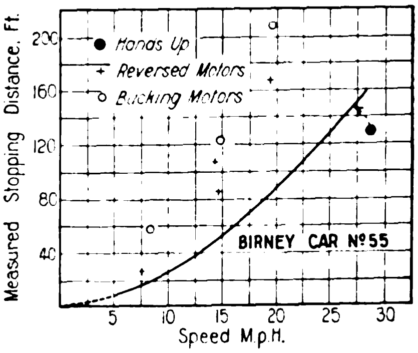
While under test, each car was equipped with: (1) A chronograph, recording time in half-seconds and car wheel revolutions; (2) a trainograph, recording brake cylinder and other pressures, and time, the time mechanism being operated from the chronograph; (3) a graphic recording speed meter with a time pen operated from the chronograph; (4) an electrically-operated counter for car wheel revolutions.

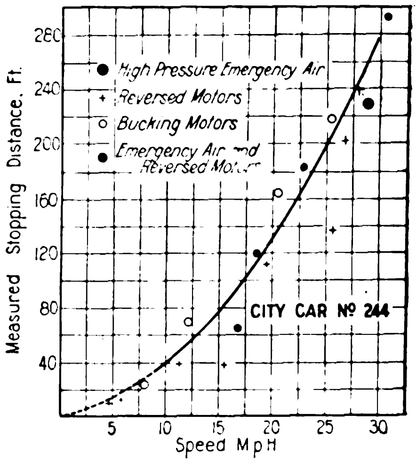
These instruments were so connected as practically to eliminate personal errors in timing. Time was also measured with stop watches. A shotgun was used to mark the track, and the report of the gun was the emergency signal to the motorman. This plan was decided upon in order to take into account the personal element of the motorman in reacting to a signal. The stopping distance was measured with a surveyor's steel tape. The speeds were determined from the chronograph records.

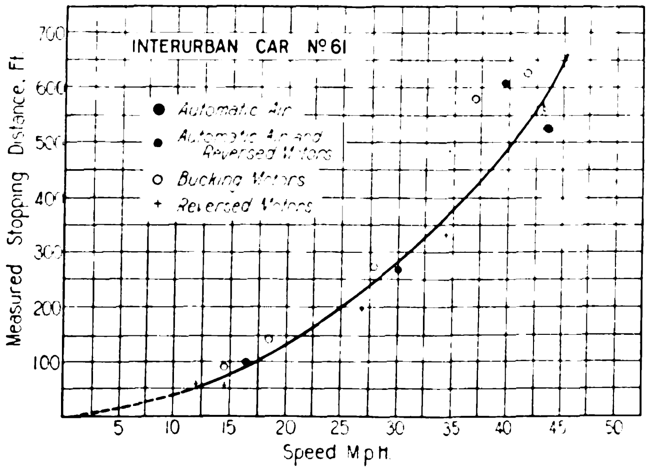
The more important data resulting from the tests are shown in the speed-distance curves. On the curve sheets the lines drawn to represent the data for emergency air braking are average lines, the points from which they were drawn not being shown. For comparative purposes, these were drawn as reference lines, and the points for the other tests were simply marked on the sheets, no curves being drawn. It must be remembered that individual points for the airbrake curves fall both below and above the average line.

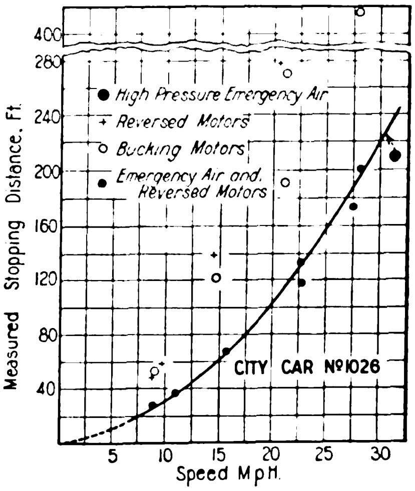
In the tests, with the Birney car, marked "Hands Up," the motorman simply raised his hand off the controller handle when he received the emergency stop signal.

Of the four cars, No. 244 was the only one in which the method of reversed motors showed any decided advantages. However, the braking power









Distances for Stopping with Emergency Air Are Shown by the Curves, and for Other Methods by the Points

SUMMARY OF CAR DATA

Car No.	61	1026	244	55
Owner	T.H.I. & E. Tr. Co.	I.S.R. Co.	Ind. Ser. Corp.	N.I.P. Co.
Type	Interurban	City	City	Birney
Weight (empty)	77,400 lb.	39,700 lb.	34,200 lb.	15,200 lb.
Number of trucks	2	2	2	1
Number of motors	4	2	4	2
Kind of motors	W-304	W-310-E-2	W-506	G.E.-264
Gear ratio	24-63	15-69	14-78	13-74
Type control	K	K	K	K
Type of brakes	Straight and Automatic	Straight	Straight	Safety
Wheel diameter	35 19/32 in.	31¼ in.	29¼ in.	24¼ in.
Per cent braking Power at 50 lb. brake cylinder pressure (car empty)	102.1	58.0	83.5	167.0

of this car is about 80 per cent, or considerably below the commonly accepted standard of good braking practice.

The tests were run under the direction of D. D. Ewing of Purdue University, assisted by P. B. McGinnis and C. W. Melephant. The analysis of the data has been under the direction of Professor Ewing, assisted by J. Y. S. Fralich. Owing to the importance of the detail data taken in addition to that on stopping distance and time, the Engineering Experiment Station of Purdue University has offered to analyze and publish the detail data. This work is now in process, and is sufficiently advanced to permit drawing of the general conclusions outlined above.

Reports of Committees, Central Electric Railway Engineering Council*

Report of Track and Roadway Committee

1. (a) What is the best way of reclaiming old track in pavement?

The best method of reclaiming old track in pavement is by welding either thermit, cast or seam welding.

If the joints are seriously surface bent, rail of the same section in lengths not less than 12 ft. should be inserted, welding the joints by any of the foregoing methods.

Inasmuch as the paving area in this 12 ft. or more of track is disturbed we recommend new ties be installed at this time upon 6 or 8 in. of gravel or stone ballast.

If it is not deemed advisable to expend a large amount of money on tie renewals and joints, iron and wood shims can be resorted to as a temporary relief, and will probably keep track in fair condition from one to two years depending entirely upon tie and subsoil conditions.

Where track is 1 in. or more over gage, tie rods should be installed, and if not too expensive as regards paving repairs, the track should be regaged and lined.

(b) What is the best way of reclaiming old track in unimproved streets?

Make a general lift, add new ballast, take care of drainage where possible by installing drainage systems through the center. Replace old bars where necessary, and if rails are surface bent to any extent, they should be replaced or straightened. This is a broad question and local conditions will have to be considered.

2. (a) What results have you had with welded joints in inclosed track?

Good results.

(b) What results have you had with welded joints in open track?

The committee recommends that only intermittent and all combination joints be welded in open track. No rail to be continuous for greater length than 60 ft.

3. What has been your experience with electric welder in reclaiming special work?

The committee has found that a great amount of special work has been reclaimed with the electric welder and very good results obtained in many cases. We think there is much room for improvement along this line. While the welding of manganese has not been as successful as hoped for, special work of this type has been kept in service for as high as three years, thus delaying renewal for that period.

4. What has been your experience in building up special work by oxy-acetylene?

The committee finds the use of oxyacetylene economical only in rail cutting and shop welding.

5. What experience have you had with treated vs. untreated ties?

The committee recommends the use of treated ties in open track and unimproved streets.

6. When joints are welded are rail bonds necessary?

No.

7. When rail joints are welded are bonds removed?

Where welding is done on old rails, if bonds are functioning, they should be left, as the welding of rail is not always as successful as expected. The general practice is not to bond the joints on new rail when joints are welded.

8. What methods have member companies used to provide proper drainage at crossings between steam and electric roads so that proper surface can be maintained?

The experience of the committee has been that no drainage is provided in most cases. In cases where drainage has been provided it has been found possible to maintain good surface, but in a few cases installation of a drainage system has been unsatisfactory. Would recommend that wherever possible some method of drainage be installed. Local conditions would determine the method to be used.

9. Has any difficulty been experienced in properly maintaining automatic track circuit block signals where cinder ballast is used?

The committee is of the opinion that with cinder ballast in contact with the rail more trouble will be experienced with signal circuits than with other kinds of ballast, buf all kinds of ballast should be kept clear of the rail.

10. Should track bonding be installed and maintained by track or overhead departments?

All bonding, design, application and responsibility should be under the supervision of the electrical department. All work to be done with maximum economy possible to all departments interested to avoid duplication of work.

11. Give comparative efficiency of the Weber or other continuous types of splicers of the four and six-hole type.

We believe while the two joints are equally efficient the continuous type requires less upkeep and the lower cost would be in its favor.

12. What effect has bad track on the upkeep of equipment?

Bad track has a decided effect upon the cost of equipment maintenance.

13. Is there a welding machine on the market that can do track welding as well as bond welding economically?

The majority of welding machines on the market can be used for bond welding economically.

Report of Power Supply and Transmission Committee

1. What is the effect on the overhead line of the use of sliding contact shoes, and are there any advantages from a transportation standpoint or from the standpoint of economy?

The principle of the sliding shoe seems to be good but the committee does not believe it has yet been fully developed to a finished and practical article, either from a transportation or economical standpoint. It has been reported as being quite successful on a few roads, reducing vibration and thus being more quiet than a trolley wheel at high speeds. There have been many sliding devices designed but none of them fill all requirements. With most of them there is trouble in backing up and some claim there is an excessive wear on the trolley wire. It is the opinion of the committee that the trolley system as developed in the past for the purpose of operating the trolley wheel is not properly designed in every respect for the operation of the shoe. The committee believes that an investigation of the subject has not been sufficiently complete and the subject would be well worth additional study.

2. (a) Are any companies furnishing power to individual consumers in the rural districts where special transformer equipment is required? (b) What equipment is furnished by the railroad company? (c) What is the basis of charge for such electric service?

(a) Yes.

(b) The committee is of the opinion that it would not be economical or practical to furnish current to any small individual consumer or limited number of individual consumers direct from any important high-voltage line. For service from low voltage lines consumer should be required to pay the entire cost of primary and secondary lines, transformers, auxiliary equipment and cost of installation, and same to become the property of the company and to be maintained and operated by it.

(c) The basis of charge should be sufficient properly and safely to maintain all the apparatus and equipment, to supply the service, to cover all the losses incidental to the service, interest, depreciation, taxes, insurance and a reasonable profit.

This subject of rural service has been most puzzling to lighting and power utilities for several years, and is receiving a great deal of study by committees of the National Electric Light Associations, various state associations, state commissions and many individual companies. It is, therefore the opinion of your committee that this is a matter of sufficient importance to justify the Central Electric Railway Association in appointing a special committee to make a study of the reports and data available for the purpose of being able to present a more practical working plan to take care of such service.

3. What should be the length of ear for No. 00, No. 000 and No. 0000 trolley wire, both round and grooved?

It is the opinion of the committee that all trolley ears for No. 00, No. 000 and No. 0000 should not be less than 12 in. in length for both round and grooved wire except in catenary construction, where a shorter type ear seems satisfactory. The committee finds no available data from which to recommend definite length of ear for each size of wire.

4. What factor of safety is allowed in insulating value for transmission line insulators?

The committee recommends for wood-pole

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*Presented before the Central Electric Railway Association convention at Cedar Point, Ohio, July 19.

construction an insulator with nominal rating 30 per cent above the line voltage. For metal-pole construction an insulator with a nominal rating next higher than that used for wood-pole construction. Climatic conditions and geographical location will also influence the selection of insulators.

It has been suggested to the committee that interconnection to an extensive transmission system backed by a large source of power might call for an increased insulator rating, and it is therefore recommended that this phase of the question be further investigated.

5. Which trolley wire has proved most satisfactory, round or grooved? What size?

The committee recommends for heavy interurban service No. 0000 grooved trolley wire and for light interurban service No. 000 grooved wire and for city service No. 00 round wire.

6. What is the most practical and economical length of span for power transmission lines carrying up to 33,000 volts on wooden poles?

The factor of safety and details of construction as required by regulatory authority should be carefully observed in design and construction of transmission circuits. When these requirements are met the most economical line is that which will have the least fixed charge and maintenance costs.

In general the following has become the practice with many member companies on transmission lines carrying up to and including 33,000 volts on wooden poles. When used jointly for trolley span or bracket construction the transmission span is 200 ft., and shorter intermediate poles are set to assist in supporting trolley wires. On other than above types of construction span length for wood-pole lines should not as a rule exceed approximately 250 ft. on single-pole construction. On H frame or steel-pole construction greater span lengths may be used.

7. What has been your experience on high-voltage transmission lines with two- and three-piece porcelain insulators of same voltage rating?

Applying this to pin-type insulators of 22,000, 33,000 and 45,000-volt service, the committee favors a two-piece insulator if properly designed.

8. What type of lightning arrester is most efficient for protection of cars, power stations and substations, and what maintenance do they require?

This question refers, as we understand it, to protection of d.c. feeders and car equipment, and for this electrolytic arresters inspected periodically and following all severe storms are recommended.

9. What are the advantages, if any, in the use of overhead ground wire for high-voltage transmission lines? (a) What kind of wire is used? (b) How installed? (c) Method of grounding.

The committee is of the opinion that the use of an overhead ground wire properly installed will eliminate the majority of insulator failures and interruptions due to electrical disturbances and is justified from an operating standpoint.

(a) It is recommended that wire be noncorrosive, preferably of copper or copper clad and of greater tensile strength than line conductors and never smaller than No. 4 AWG.

(b) Preferably on bayonet, for single-arm construction and supported by an insulator of not less than 6,600-volt rating. On two-arm type of construction ground wire should be supported by insulator or pin in end pin hole of top arm.

(c) The aerial ground wire should be connected to earth at intervals not greater than 500 ft. The wire used for this purpose preferably should be copper and effectively grounded and should not come in contact with any of the pole-line hardware.

Report of Car Equipment Committee

1. (a) Have any of the companies experienced difficulty with 9¼-in. hub on steel wheels in boring out for 6½-in. or 7-in. axles? Have any companies been able to secure larger hub?

(b) On 26-in. wheels are companies able to secure a 3-in. or 3½-in. interurban flange and tread?

(a) No actual breakage has been experienced with the 9¼-in. hub but most of the mechanical men feel that the hub is too small for the bore of the axle. This matter has since been taken up with the American Electric Railway Association, and a 10½-in hub has been adopted and companies should have no further difficulty in getting the larger hub.

(b) This is not a standard wheel but the committee has taken up the matter with various wheel manufacturers. One firm at the present time agrees to furnish this wheel.

2. (a) What is the minimum length of trolley pole that can be used for 22-ft. and 24-ft. trolley height, taking into consideration the various heights of cars? (b) Is it possible to standardize length of trolley pole? (c) What tension should be used on trolley pole for various heights of trolley wire?

(a) Trolley pole length should be figured for car and wire heights. A pole riding wire at an angle from 45 to 60 deg. with car roof gives very good service.

(b) Cars of the same height can use a standard length pole, but a standard for the field at large cannot be established. The committee is of the opinion that this subject should receive further consideration and a report be rendered at a future date.

(c) Trolley pole tension can be determined best locally due to the fact that the overhead trolley construction, the condition of track and condition of rolling stock all affect the trolley tension. The committee recommends the subject be given further consideration.

3. (a) What are the relative merits of the sliding contact shoe as compared to the standard trolley wheel? (b) State average life and mileage of both trolley wheel and contact shoe?

(a) The shoe has greater area of contact, making a more efficient current collector. Rides the wire better than the wheel. Makes less noise and less vibration at high speed. Less tension required on trolley pole. Causes trouble when running backward.

(b) Wear on trolley wire not determined. Tests show 60 per cent greater mileage with shoe as compared to trolley wheel.

In view of the fact that the shoe is still in an experimental stage, the committee recommends that same receive further study.

4. What experience have you had with building up flanges by electric welder on city cars? On interurban cars? What is the cost of building up such flanges? How much extra mileage can be obtained in this manner? What is your method of building up flanges?

The committee has found that a few roads have been apparently successful in building up flanges by the welding process on steel wheels. A number of roads have reported as failing to obtain results worth while. It is believed that equipment available and experience of operators during such welding has been responsible for discouraging results in a number of shops. We believe the subject has sufficient merit to justify additional study.

5. What is the average life of brush-holders on ventilated motors and non-ventilated motors?

No definite figures were obtained as to the average life of brush-holders, but it was agreed that all cars with the ventilated type of motors wore out brush-holders and also the brushes more rapidly than the non-ventilated.

6. What saving, if any, can be made in the wiring of cars by the use of flexible metallic conduit as compared to rigid conduit? What saving can be made in insurance costs if underwriters can be induced to accept flexible conduit at the same insurance rate as the rigid?

The committee does not recommend the use of flexible metallic conduit for power wiring, as it has been found too light for motor work. It can be used for light wiring and a saving made in installation costs. No difference in insurance rates has been expressed as it has been approved by the fire underwriters.

7. What are the relative merits of tin base vs. lead base metals for bearings?

The committee recommends tin base metal for motor bearings, lead base for journal bearings and brass for axle bearings.

9. What is the effect on motor and gear maintenance of too much wear on body and collar of axle bearing? (a) What is permissible wear on the body of axle bearings? (b) What is permissible wear on collar of axle bearings?

Excessive wear on collar or flange of axle bearings permits the motor to lunge from side to side as the car hits sharp curves or sways from side to side. This aggravates the condition, causes the armature to pound its bearings and causes sparking at the commutator. It permits misalignment of gear and pinion faces, resulting in more rapid and uneven wear of both and increases the liability of tooth breakage due to the uneven surface worn across the face of the teeth.

Excessive wear on the body of the axle bearings allows the gear centers to spread. This increases the wear on gear and pinion teeth and in extreme cases might permit the gear and pinion to disengage. After a little wear, the tooth loading is all thrown upon the tips of the teeth, which results in tooth breakage if allowed to continue for any length of time.

(a) It was agreed by most of the roads that good practice allowed about from ⅛ to 3/16 in. wear on the body of the bearing.

(b) It was agreed that the flange wear was not as vital with the main body of the bearing but that this was easier to keep maintained so that it was thought that the maximum allowance should be about from ⅛ in. to 3/16 in. as this is a very easy and inexpensive matter to adjust.

10. There has been but little improvement in design of gear cases for twenty years. What suggestions for improvement in this design are recommended?

This question has been thoroughly discussed and no definite suggestion in designs have been developed.

11. What effect, if any, does fast controller feeding have on equipment?

Effects are most noticeable in city service where frequent stops occur with close headway of cars. Generally too rapid notching causes more equipment failures and increases maintenance cost. On short runs fast controller feeding frequently is one cause of overheating of motors. The tendency of some motors to flash is also increased because the motor is saturated magnetically from the high accelerating current while the rapid notching imposes sudden and wide volt variations in motor. Excessive heating dries out the insulation, causing loose bands and windings. The excessive accelerating currents set up magnetic stress which produce severe mechanical strains in the winding and cause armature leads to break. Gears and pinions are affected. Controllers wear out contacts and fingers unduly because of excessive current handled. Circuit breakers operate more frequently. Flickering of car lights becomes a source of annoyance to passengers.

12. What is the best practice for making emergency stops to avoid accidents?

By tests made very recently by a committee of the Central Electric Railway Association it was found that up to 15 m.p.h. reversing the motors was most effective. For speeds greater than 15 m.p.h. the use of the air brake was more effective. (See report of special committee on emergency stop test, printed in this issue.)

13. Should the Engineering Council pass upon the merits of new equipment or devices submitted by manufacturers for test?

Yes, in so far as they have facilities and equipment.

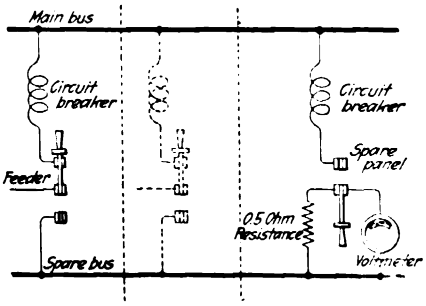
Maintenance of Equipment

Test Resistance Reduces Breaker Maintenance

By G. H. McKelway

Engineer of Distribution Brooklyn-Manhattan Transit Corporation

When a ground causes a reclosing circuit-breaker to open, the line can be made alive as soon as the ground has been cleared; or when the breaker opens because of an overload it can be closed immediately. With a manual circuit breaker, however, this cannot be done. The general practice to test the line after an interruption is to close the breaker. If it stays closed it proves there is no ground, while if it opens again a ground is present. The usual procedure is to wait perhaps a minute and then try again, repeating at intervals until the circuit breaker stays in or word is received that there is trouble and the line is to be left open until further orders.



Circuits for Test Panel to Indicate Grounds

Testing in this manner is very hard on the breaker, as the heavy current must be broken repeatedly in case of a ground. A bank of lamps or a voltmeter cannot be used to test for a ground, since the car lamps, or sometimes the controllers on the stalled cars, are usually turned on so the car crew will know when power is restored.

In order to determine if it is safe to close the switches and pick up the line after the circuit breaker has blown, and yet save the breakers from abuse, one large company is making use of what it terms a "test resistance." The switchboards of this company have two positive buses, one of which is used regularly, the other being used only for transferring a feeder from its usual circuit breaker to a spare one mounted on a separate panel. Each of the regular panels has a double-throw switch, with the outgoing feeder terminal attached to the center stud. The main bus is connected to the upper stud through the circuit breaker, and the spare bus is connected to the lower stud.

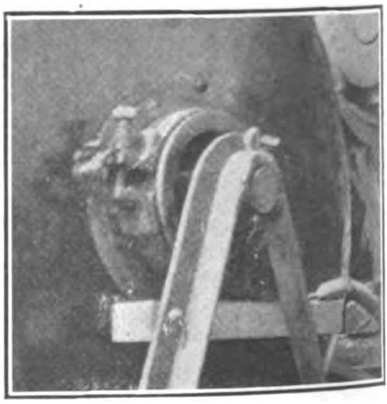
The center stud of the spare panel is connected to the spare bus through a resistance of about 0.5 ohm. By throwing the feeder switch down the feeder is connected to the spare bus, and through the resistance to the switch of the spare panel and thence to the circuit breaker on that panel and to the main bus.

The resistance limits the current with a dead ground to a little more than 1,000 amp., an amount that can be broken without damage to the breaker. A voltmeter is connected so as to measure the drop across this resistance, by which means the station operator can see whether the line is grounded. In case it is, he opens the breaker and tests the line a little later, the comparatively small amount of current flowing through the resistance being insufficient to trip the breaker automatically. If a low reading of the voltmeter across the test resistance indicates that but little current is flowing, it is safe to pick up the line again on the regular circuit breaker.

By the use of this test resistance, the feeder breaker has to endure the strain of opening under a heavy overload but once for each short circuit, since thereafter the load is transferred to the spare circuit breaker; and the current flowing into the feeder is limited by the resistance.

Motor Truck Facilitates Track Welding and Bonding

The Newport News & Hampton Railway, Gas & Electric Company has rigged up a portable welding outfit which facilitates bonding and rail-welding work. A General Electric motor-generator welding outfit is mounted in a light truck, which also carries, just inside the tailboard, a pair of reels for the positive and negative cables.



A "Close-Up" Which Shows the Details of the Bearings and Electric Contact Device

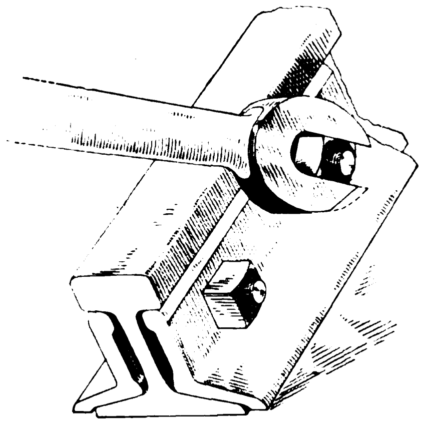
One end of each cable is connected to an insulated sleeve projecting from the end of the reels, to which current is fed through a band contact device. The band is held close around the sleeve by means of a light

This Truck Renders the Welding Outfit Highly Portable

By Means of Cables Wound on Reels, the Outfit Is Given a Wide Range of Action spring which presses together two angles attached to the end of the band. The reels are supported on angle-iron stands of inverted U-form.

Modified Track Wrench

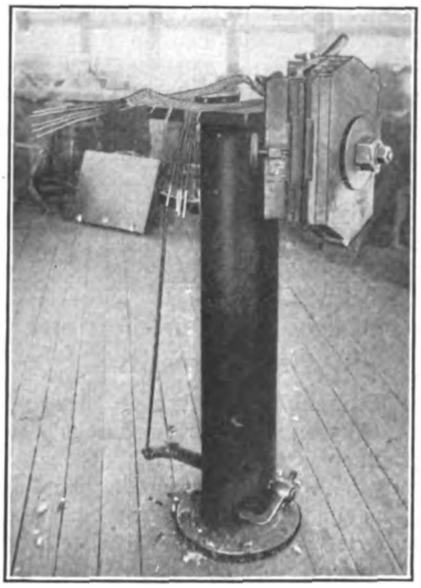
IT HAS been found advantageous by the Municipal Railway of St. Petersburg, Fla., to grind off a portion of the wrench used in tightening track bolts, as shown in the accompanying illustration. Where a square nut is used with bolted joints on low T-rail, the track wrench is likely to become worn where it comes in contact with the base of the angle bar. If the wrench is tempered sufficiently so that it does not wear out, it will often chip off at the point. The difficulty has been overcome on this railway by grinding down one side of the wrench. Both sides of the wrench are not ground down, as it is felt that to do so would weaken it. After the wrench has been modified it is used in one direction only, because one side is stronger than the other. It may occasionally be reversed, but should not habitually be used in that way.



Clearance for Turning Nuts on Low Rail by Grinding Off Wrench

Convenient Home-Made Coil-Winding Machine

A SHOP-CONSTRUCTED machine for winding armature coils is used by the Lehigh Valley Transit Company, Allentown, Pa. The head for holding the coils has convenient hand screws and plate attachments and, in addition, provision is made for rotating the head so that it is unnecessary for the operator to leave his place in order to get a more advantageous working position. The head is locked and unlocked by operating a pedal which has a connecting rod attachment, with a bellcrank lever working the locking rod in and out of the head portion. When the pedal is depressed the coil fixture can be rotated as desired.



Home-Made Armature Coil-Winding Machine

The Air Brush Is Supplanting the Hair Brush

By Dennis O'Brien

Foreman Painter Brooklyn-Manhattan Transit Corporation

AN AIR-BRUSH or paint-spraying machine has been used for applying paint to car trucks, under bodies of passenger cars and miscellaneous equipment for a considerable time. The air brush, however, was not used with any great success as a vehicle to be used in applying the finishing coats to the body of the cars until quite recently. While the air brush will never entirely supersede the hair brush, it is and must be recognized as a valuable adjunct to the paint shop and the greatest contribution engineers have ever given to the paint trade.

The economic value of the air brush cannot be overestimated. Its use reduces the cost of car painting from one-third to one-half of the cost of painting by the hand-brush method. The savings on two actual jobs show its true economy. On a 28-ft. body, semi-convertible inclosed vestibule type of car, the time consumed by hand-brush enameling the exterior of body (long oil heavy bodied para red enamel) was nine hours (piece work). The actual time taken with an air brush for the same job was four and one-half hours, a saving in time of 50 per cent.

Let us make an analysis of the operation and see what is saved in varnishing 420 sq.ft. of surface:

	Labor	Varnish
Hand brushing 420 sq.ft. at $0.65 per hour	$2.60	$3.00
Air brushing 420 sq.ft. at $0.65 per hour	.65	3.60
Labor saving by air brush	$1.95	
Additional cost of varnish		$0.60

By subtracting the 60-cent additional cost of varnish from the amount of labor saved by use of the air brush we find a saving of $1.35 for the operation. The amount of material used is about 20 per cent greater with the air brush over the hand-brush job, but it does not follow that this 20 per cent of material is wasted. It is true that in the process of atomizing some of the material goes into the atmosphere, but the greater portion of the additional material adheres to the surface being painted or varnished. You will find more enamel and varnish on the floor of the paint shop where they still use the hand-brush method than you will find in the shop where the air brush is used.

The question uppermost in the mind of the man about to adopt the air-brush method for painting is: What outfit is best for the particular line of work? There are a number of outfits in the market today, each with some individual feature not contained in the others which impresses the buyer.

Several types employ a needle valve to take care of the viscosity of the materials. The needle valve requires adjusting, and for that reason some foremen painters do not favor it as they feel that a new man being introduced to the air-brush method of work cannot be trusted to make adjustments on the machine.

One outfit has no needle valve; the viscosity of the material is cared for by five different sizes of fluid parts through which the material passes. These fluid parts resemble cartridges. Each part is made to satisfy the viscosity of material, from a japan color to the heavy body paints or enamels. These fluid parts can be attached or detached in an instant and no adjustments are required. In addition to the fluid parts there is an oil and water separator attached to the material tank, thus insuring free, clear, clean air.

Another feature of importance in spray painting is the type of container used to hold the material.

Small railway properties often use several different colors on the car body and so do not favor a container that must be cleaned out after each color.

Any paint, enamel or varnish that can be hand brushed can also be air brushed. Obnoxious fumes and excessive vapor can be overcome by the paint or varnish maker. A pure turpentine spirit instead of turpentine substitutes, or vegetable oils, made soluble in mineral turpentine and called pure turpentine, used by the varnish manufacturer will do a great deal toward eliminating excessive vapor. The less the amount of volatile matter and the purer the volatile the less vapor and fumes.

There may be some objection to using white lead with the air brush due to lead poison or painters' colic. Lead poison or painters' colic is classified as an occupational disease by the workmen's compensation boards and as such leaves the employer liable. White lead is not the only and best white pigment, however. Oxide of zinc will do all that white lead will plus a greater permanency of color and it is not a poison.

Lithopone for interior work is far superior to white lead and is not poisonous. In roof or floor paints where the basic pigment is silica, china clay, or barytes, it is advisable to use metal-lined material hose. These paints on account of their peculiar pigmentary structure and stony nature act like an abrasive and readily destroy any hose which is not metal lined. The ordinary rubber material hose is satisfactory for use of other paints or varnishes.

Air-brush manufacturers recommend using thinners in the paint. I am opposed to thinners in any paint. Enough air pressure will make the air-brush function; thinners and extenders tend to destroy paint and cause a vapor which would never otherwise be there. I don't quite agree with those who hold that any Tom, Dick or Harry can be taught to use the spray in jig time. The better the painter the better the air-brush job.

Sags and ugly runs are caused by operating too close to the surface being painted. The air brush should be held and operated from about 8 to 12 in. away from the surface. The painter learning to operate the air brush should in the beginning carry a hair brush to pick up sags and runs. This will be for but a short time as he will soon become adept. The painter operating the air brush should also be furnished with a respirator and goggles. The respirator can be of light aluminum with a moist sponge and the goggles the standard safety make. The glass in the sash of the cars can be protected from an accumulation of paint and varnish by shop-made window shields.

New Equipment Available

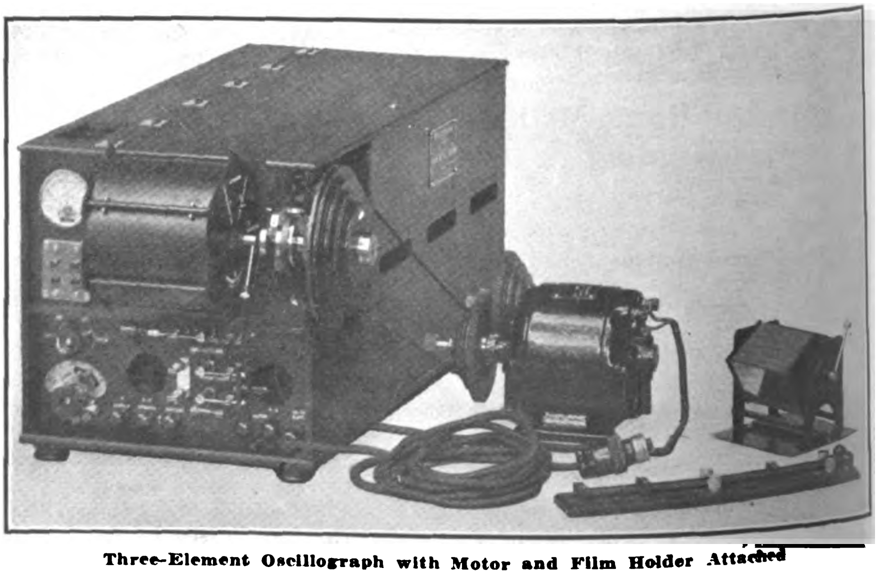
Portable Three-Element Oscillograph

To MEET the increased need of electric railways for an oscillograph outfit which is readily portable and which will work satisfactorily on a moving car, the Westinghouse Electric & Manufacturing Company has recently brought out such an instrument. The new oscillograph is compact and portable and is more easily operated than previous types.

The instrument consists essentially of an instantly responding moving coil galvanometer and an optical system to cast a beam of light on the vibrating mirror from the galvanometer, from which it is reflected to a photographic film passing at right angles to the vibrating beam. This gives a current-time record on the film in which distance along the film is proportional to the time, and the deflection is proportional to the instantaneous value of the current passing through the galvanometer vibrator.

This new oscillograph galvanometer actually consists of a single turn of very fine conductor supported by two ivory bridges so that the effective part of the coil is essentially two parallel wires with the current passing down one wire and up the other. This coil is located in a strong magnetic field. The motor action of the conductors carrying a current at right angles to the lines of force of the magnetic field tends to force one wire forward and the other backward in proportion to the current passing through them. These parallel conductors are kept very taut by a tension spring which transmits its force to the loop through a lever and tiny ivory pulley. A very small mirror bridges the parallel conductors at the center of the magnetic gap. This reflects the beam of light to the photographic film, the deflection being proportional to the instantaneous current in the conductors. Any vibrator element may be connected across a shunt to record instantaneous values of line current, or it may be connected through a series resistance to act as an instantaneous voltmeter.

The new oscillograph is complete in one unit except for the motor and film holder. The main unit is 11 in. wide, 11½ in. high, and 25 in. long, and includes the entire optical system, special incandescent lamp, sensitive three-element galvanometer, complete control equipment for vibrator elements, transformer for operating lamps and motor, and control for galvanometer field. There is also a "Rectigon" for charging the galvanometer-field storage battery and a set of busbars, fuses and for controlling the apparatus.



Three-Element Oscillograph with Motor and Film Holder Attached

The News of the Industry

Wage Rise in Chicago

Arbitrators Decide Surface Men Shall Have 3 Cents More Now and 2 Cents More Next Year

Employees of the Chicago Surface Lines will receive a wage increase of 3 cents an hour for one year, retroactice to June 1, and an increase of 5 cents an hour from the present rate for the year beginning June 1, 1924.

This is the award made by the arbitration board which settled the wage dispute between the union men and the railway. It means that conductors and motormen, who have been receiving 70 cents an hour, will be paid 73 cents during the current year and 75 cents an hour next year. The increase will add $1,200,000 to the company's payroll in 1923 and $2,000,000 in 1924.

The wage increase applies to about 11,000 trainmen and 3,000 employees in various other departments. The only groups excepted from the pay boost are substation operators, maintenance of way men, linemen and wreck wagon men. The wage advance affects conductors, motormen, mechanics, who are members of the carmen's union, electricians, car repairers, "dopers" (men who grease cars), shopmen, body repairers, washers and many others. These classes are working under various wage scales, but all will get the same increase per hour.

The men had demanded an increase of 10 cents and hour and a strike was narrowly averted by Mayor Dever, who succeeded in getting both sides to agree to arbitration and to accept a wage scale which would be binding for two years. The pay boost sought by the men would have added $4,000,000 to the company's payroll.

Arbitration of the wage dispute between the union men and the Chicago Elevated Railroads began on July 26.

The decision in the case affecting the wages of the surface line men was hailed by all concerned as a great victory for arbitration. Both sides were pleased with the speed with which the hearings were conducted and the rapidity with which the award was made. While union representatives were disappointed that the wage increase was not greater, they accepted the ruling of the arbitration board and the company officials announced that they will carry out the provisions of the award. It was stated that no request for a fare increase will be made of the Illinois Commerce Commission unless the increase in operating expenses forces it.

The hearings began on July 9 and the presentation of evidence actually consumed only nine and one-half days. Francis X. Busch, who acted as umpire of the board, said:

> This is, I believe, a record for the country. In 1912, the traction arbitration dragged through three months here. Employees naturally had set up the cry that mediation was a subterfuge through which they were "stalled" for an unreasonable time. We have dissipated this conclusion, we believe, and much credit for the achievement is due to William D. Mahon, international president of the carmen's union, for his willingness to arbitrate.

Mr. Mahon issued a statement accepting the award without reserve and stating that the cause of arbitration had been helped very materially by the prompt action of the board. He said:

> We accept the award in the same spirit that we have always accepted arbitration awards and mediation agreements. The award will be carried out faithfully.
>
> I regret that the board could not get our viewpoint and award us the 80 cents an hour that we sought. However, I realize that the board has not only taken into consideration the contentions of the men and the company, but also considered the public's interest, which lies in the rate of fare question.
>
> As to the arbitration and the manner in which it was conducted, I want to congratulate the board and especially Chairman Busch. For a big arbitration, involving as many men as this one did, it was carried through and finished more satisfactorily and more quickly than any other arbitration with which I ever had anything to do. During the arbitration he made both sides eliminate all unnecessary evidence, and in that way hastened and brought forth an award speedily. If arbitration in disputes of this kind is to be successful that policy must be followed.

The cost of living and the trend of wages in industry were the chief factors considered in the arbitration proceedings. William Levine, representing the unions, submitted a budget intended to show that men with families of five, said to be the average, could not live decently on less than $2,214 a year, which would be their income at 80 cents an hour, working eight hours a day through 313 days. The companies' attorney placed against this the so-called Washington budget, brought up to date, which would allow $1,302 a year for a family of five.

Company Not in Default on Improvements

Cincinnati Traction Denies Charges Made by Street Railway, Which It Operates Under Lease—Refinancing Plan Details Made Public

AN EMPHATIC denial was expressed by the Cincinnati Traction Company on July 20 of the charge that it was in default to the extent of $4,000,000 in repairs and renewals to the properties of the Cincinnati Street Railway. The reply of the traction company to the street railway is the result of a letter sent to the traction company by the Cincinnati Street Railway on April 23, in which the latter company requested the lessor company to make repairs to its properties to the extent of $4,000,000 or surrender its franchise. The claim of the railway is based upon a survey of the property made by the engineering firm of Stone & Webster, Inc., Boston. In its reply the traction company contests this claim to a large extent and produces figures of its own to show that the $4,000 000 is greatly in excess of the actual sums needed to put the property in first-class condition.

Following receipt of the reply, the special committee of the Cincinnati Street Railway announced that it would move for arbitration of the controversy. Under the terms of the franchise each company has thirty days in which to name an arbitrator, the two arbitrators to choose a third.

The traction company contends that the city of Cincinnati is responsible for the situation. because under the service-at-cost franchise passed by Council on Aug. 23, 1918, the city administration received full authority over all expenditures to be made by this company for maintenance, repairs, renewals, additions and betterment of the property. Furthermore, the traction company held that it had combined in all respects with the terms of the service-at-cost franchise and in additions has expended money upon the property as permitted by the city's Street Railway Director, who under the terms of the franchise has full regulatory jurisdiction over the street railway system of Cincinnati and its operating companies.

The traction company says that the report of Stone & Webster, Inc., did not take into consideration conditions that it holds are vital to the question at issue. A considerable amount of trackage that the report declares should be renewed has been or is to be abandoned and in such cases the traction company contends there is no occasion to go to the expense of renewing such tracks. This also applies to the power stations that were discontinued when the traction company arranged to buy a large percentage of its current from the Union Gas & Electric Company. Further, the contention is set forth that it is impossibe for the company to go ahead with new track replacements except where the city is ready to renew the streets in which these tracks are laid. The traction reconstruction program must of necessity wait on the city's street reconstruction program. In view of this situation it is said to be impossibe to make all the replacements demanded this year, and in any circumstances such program would have to be extended over a period of years to comport with the city's program.

In furtherance of its refinancing program, the Ohio Traction Company, which owns the entire capital stock of the Cincinnati Traction Company, filed for record a mortgage to secure a bond issue of $4,400,000 in which the Union Trust Company, Cincinnati, is designated as trustee, the mortgage covering all of the properties of the Ohio Traction Company subject to a prior mortgage to the Fidelity Trust Company, Philadelphia, March 1, 1911.

It was announced that $2,648,000 of new bonds will be issued at once to refund the 7 per cent notes of the traction company which matured on Jan. 1 last, but which were extended to Oct. 1 next, of which there are still outstanding about $700,000.

William Jerome Kuertz, City Director of Street Railroads, explained that the 6½ per cent bonds which the Ohio Traction Company announces it will issue to refund old debts will require no further authorization from his department nor from the Ohio Public Utilities Commission. The issue was provided for in 1920, when the Utilities Commission and W. C. Culkins, then Director of Street Railroads, authorized the issuance of 7 per cent short-term debentures to take care of outstanding obligations.

The mortgage given by the Ohio Traction Company is designated as a general and refunding issue securing twenty-five-year convertible gold bonds, all bearing interest at 6½ per cent per annum. The bonds will run to Dec. 31, 1945, with interest payable semi-annually in January and July.

The Ohio Traction Company conveys under this mortgage to the Union Trust Company, trustee for the bondholders, all its system now owned or hereafter constructed or acquired in Cincinnati, including the line to Hamilton, and as further security pledges 14,995 shares of capital stock of the Cincinnati Car Company of the par value of $100, aggregating $1,499,500 and being all the capital stock of said company, except five shares. It also pledges 19.989 shares of capital stock of the Cincinnati Traction Company of par value of $1,998 900, being all the capital stock of said company, except eleven shares. The mortgage also covers the Traction Building, located on the corner of Fifth and Walnut Streets. The mortgage is made subject to a mortgage of March 1, 1911, made to the Fidelity Trust Company, Philadelphia, to secure a bond issue of $2,500,000.

The letter of the Cincinnati Traction Company to the Cincinnati Street Railway was signed by W. Kesley Schoepf, president. After referring to the several communications between the companies and to the charges that were made, Mr. Schoepf said:

> This company denies that any condition exists which would constitute a default, under the above mentioned lease, as claimed in your first letter of April 20, 1923, with Exhibits A, B and C attached. Your before mentioned communication is the first and only complaint received from you as to the condition of the street railway property leased from your company during the twenty-one years of this company's operation.
>
> On Aug. 23. 1918, the Council of Cincinnati passed Ordinance No. 253-1918, revising the terms and conditions of the grant from the city of Cincinnati to the Cincinnati Street Railway, adopted by the Board of Administration of the city of Cincinnati on Aug. 13, 1896. Your company was represented by its officers and legal representative throughout the negotiations of the terms and conditions to be embodied in the revision of the franchise, which was considered in public meetings in the Council chamber, and after its passage said Ordinance No. 253-1918 was formally accepted by your company.
>
> No complaint was made about or of the condition of the property leased from your company at the time of the passage of the revision ordinance, and since then it has been continuously maintained and operated under the terms of said ordinance.
>
> This ordinance, which you accepted and the terms of which you agreed to, provided, among other things, that the city of Cincinnati was clothed with full authority over all expenditures to be made by this company for maintenance, repairs, renewals and additions and betterments to the property, and this company has complied in all respects with the terms of said ordinance and has expended upon the property leased from the Cincinnati Street Railway all sums required or permitted to be expended by the city of Cincinnati and shall continue to do so throughout the terms of the franchise.

Purchase Contract Terms Drawn

Special Committee Ready to Report on Milwaukee Service-at-Cost Arrangement

F. W. Luening has been contributing to the Milwaukee *Journal* a series of signed articles on the matter of the contemplated purchase of the local railway lines and light property there by the city, brief mention of which was made in the ELECTRIC RAILWAY JOURNAL of July 21, page 114. The exact terms of the proposed contract will not be made known until the ordinance covering the matter has been introduced in the Council, but the general provisions have been discussed publicly. Mr. Luening says that members of the acquisition committee consider the tentative contract highly favorable to the city and believe its terms should be accepted by the municipality. It also is said that they have endeavored to correlate the views of those who favor municipal ownership, those who favor municipal control, and those who favor private management. They have established a mutually agreeable arrangement whereby the property will continue to be privately managed, municipally controlled, and ready for municipal purchase if, after a period of trial the people of Milwaukee should desire to make such a purchase.

In commenting on the valuation matter Mr. Luening said:

> The property value of the Milwaukee Electric Railway & Light Company, as appraised by the Railroad Commission in 1914, was $35,805,654. The value of the Milwaukee Light, Heat & Traction Company property, as estimated by the Railroad Commission in the same year, was $15,426,105. This gave a total combined value of $51,231,754, from which was deducted depreciation and other items bringing the total down to $43,871,530. There have, however, been additional investments since this appraisal was made and for this reason additions to the total have been agreed to.

It is said that the contract provisions will include:

1. Management shall remain with the company, but the character and quality of the service shall be prescribed by the city.
2. Street car fares may fluctuate, from a possible minimum of 4 cents to 5 cents, to a probable maximum of 8 cents. The fluctuation will be automatic and will be controlled by a "stabilizing reserve fund."
3. The company will be required to make extensions in its railway system, light and power lines whenever and wherever ordered to do so by a three-fourths vote of the Common Council; but if such extensions are arbitrarily ordered by the city and should prove ill-advised and unprofitable the city will pay the actual cost of the extension, but ownership of them will thereafter rest with the city.
4. The city may participate in the financing of the company by purchasing its bonds junior to all outstanding bonds or liens, as of Jan. 1, 1923.
5. A "city equity fund" also will be established to which will be credited any amount exceeding necessary requirements in any of the company's reserve funds.
6. A public utility commissioner will be appointed and the cost of his department not exceeding $60,000 in the first year, is to be considered part of the operating expense of the company.
7. The commissioner will be named by the city. His department will constitute a kind of local railroad commission and will be the instrument through which the city will exercise its rights in public utility properties.
8. Matters of disagreement or dispute will be submitted to a special arbitration board or the Railroad Commission, if so elected by the city. However, the city's right to control and demand service shall not be subject to arbitration nor shall the stipulated rate of return to be allowed the company be arbitrated.
9. The company's relation with its officers and employees will not be disturbed.
10. The proposed contract will continue ten years and may then be terminated, but only if voted upon by the people during the eighth year. Unless rejected by the voters the contract will automatically continue for ten-year periods thereafter.

The committee on acquisition was organized by resolution of the Common Council on Feb. 24, 1919. Its members are Fred S. Hunt, chairman, president of the Milwaukee Dustless Brush Company; William E. Black, attorney and member of the firm of Upham, Black, Russell & Richardson; J. J. Handley, secretary, Wisconsin State Federation of Labor; Lyle H. Olson, general manager of the American Appraisal Company; J. W. Radke, Albert Janicki and John Doerfler, Jr., members of the Common Council, and M. E. Glaser, secretary of the committee.

The committee began its work almost immediately after organization. It undertook an analysis of the company's operations, its investments and all that related to street railway, light, heat and power service in Milwaukee.

It compiled a report that includes hundreds of pages of typewritten matter and hundreds of charts, maps and diagrams. It prepared a summary report in printed form July 25, 1921, submitting it to the Common Council. In that report it was able to offer a mass of historical data, but was not ready to announce conclusions. It suggested, however, that a contract with the North American Company—the company owning or controlling the local property—would be needed and that in such contract agreement might be reached whereby Milwaukee could receive its electric service at cost, while private management could still receive a fair return on its investment.

Following the submission of this document, the committee was instructed by the Council to continue its work. This it has done in the intervening period.

Mr. Luening said of the future:

> It is said that there are only minor details awaiting adjustment and that the acquisition committee and the North American Company undoubtedly will be able to reach an agreement in the next few weeks. It is admitted, however, that the remaining details are vital and relate to the exact amount in profits, or returns for managerial services, to be allowed the North American and local company.
>
> If these final details can be consummated, it will remain for the Common Council to accept the proposals outlined in the contract and thereafter submit them to the people at a special election.

Electrification Rumors Premature

Recent reports in the daily press regarding possible electrification of the Santa Fé were based on rumors of a study made for electrification of one of the divisions of that company in the Western desert country. From authoritative sources it is learned the company has no work of this kind under consideration to be carried out in the near future. Like most of the other roads operating out of Chicago, the Santa Fé has reports of one kind or another on electrification possibilities, but these are only preliminary studies that mean nothing but a basis for possible future improvements. Probably every road in Chicago has in hand preliminary plans looking toward electrification of the terminals there, but the Illinois Central plans are the only ones that so far have been reduced to anything like tangible form in carrying out.

Arbitrators Named for Cincinnati Wage Issue

The board of arbitration has been selected which will hear the demands of employees of the Cincinnati Traction Company for a wage increase. The members are former United States Judge John Weld Peck, selected by the traction company; Attorney James H. Vahey of Boston, selected by the employees, and former Ohio State Supreme Court Judge Joseph W. O'Hara, selected by the two other members. Under the terms of the present agreement between the company and the men the decision by the board of arbitration will be final and binding upon both sides. The present scale is 42 cents an hour for the first three months service with the company, 46 cents an hour for the next nine months and 48 cents an hour after one year. The platform men (conductors and motormen) are asking for an increase of 17 cents an hour for all grades. The carhouse men, numerically a small proportion of the company's total employees, are asking for a 35 per cent increase. The present wage scale expired June 30, but under the terms of the agreement the existing wage shall be paid until a new agreement is reached.

Strike of Electrical Workers Settled in St. Louis

The strike of 175 electrical workers of the United Railways, St. Louis, has been settled. The men returned to work on July 25 agreeing to negotiate further with the receiver. This means a return to conditions of a week ago when they walked out over the demand for 92 cents an hour. The present scale is 78 cents. The receiver offered 83 cents and the men's final demand was 87. They rejected arbitration. The deadlock lasted six days. On July 25 Manager Perkins delivered an ultimatum in which he said he would fill the men's places and not negotiate further unless the men first returned to work. He gave a twenty-four-hour time limit. The men voted to return. Meantime service has not been interrupted. The office force and foremen have manned the power stations and line work.

Ford to Electrify D., T. & I. Road

Plans are under way for the electrification of Henry Ford's Toledo & Ironton Railroad, running from Detroit, Mich., to the Ohio River. This is indicated in an article printed in the "D., T. & I. News," official publication of the railroad. The power will be supplied from Ford's Rouge River plant, the capacity of which is to be greatly enlarged.

The article in the "D., T. & I. News" concerning the electrification of the road follows in part:

> The present plans call for the building of new locomotives, the doubling of the power capacity of the Rouge River plant, which will furnish power for the first division to be electrified, and the construction of 13¼ miles of double track between the Rouge River plant and the Flat Rock yards.
>
> In keeping with the general improvements that the Detroit, Toledo & Ironton Railroad has undergone under Ford ownership, electrification will give the road a vastly superior motive power. .
>
> The new electric locomotives for the D., T. & I. railroad for freight service will weigh 360 tons, have a normal capacity of 4,000 hp. and be capable of producing 5,000 hp., for an hour. They will have sixteen axles and will develop 108,000 lb. drawbar pull at 25 m.p.h.

Transit Company Ready

T. E. Mitten, chairman of the executive committee of the Philadelphia Rapid Transit Company on July 17 definitely pledged his company to the operation of the rapid transit lines comprised in the comprehensive plans agreed upon by the engineers of the city, the company and the central business interests. On the question of terms under which operation is to be undertaken, Mr. Mitten stated that he was unable to make any definite proposal until the completion of the traffic check.

A significant development at the meeting of the Councilmanic Transit Commission on July 17 was the announcement by Mr. Mitten that if the city would, in addition to "Step No. 1," undertake the construction of a surface subway on Chestnut Street, to enable the removal of the present surface tracks on that street and on Walnut, the railway would contract to pay during the lifetime of the city's bonds the full amount of the required interest and sinking fund. This would mean that with an assured return from the outlay the $18,500,000 estimated cost of the surface subway would not have to be counted against the city's borrowing capacity. The advantage of this was so obvious that the commission, by unanimous consent, added this feature to its "Step No. 1," final adoption of which is on its program for its next session.

Two other important changes in the program for immediate construction were made, providing for a four-track subway on Broad Street for the full distance from Olney Avenue to Spruce Street, and for the modification of the Chestnut Street-Darby line by extending it as a subway west on Chestnut to Forty-second and thence on Forty-second to Woodland Avenue by an elevated structure, the remainder of the line on Woodland Avenue also to be elevated.

Key System Employees Accept Three Cents Increase

After twice rejecting the offer of the company, employees of the San Francisco-Oakland Terminal Railways (Key System) on July 7 voted to accept the company's proposition of an increase in wages of 3 cents an hour over the former scale. The vote was 444 in favor to 115 against.

The new rates for traction division motormen and conductors and Key division brakemen are 49 cents for the first three months and 52 cents for the next nine months and 56 cents thereafter. Key division motormen and conductors will receive 2 cents higher than the scale just mentioned. These rates, according to the company's original proposition are retroactive to June 1 and will remain in effect until May 1, 1924.

The trainmen of the San Francisco-Oakland Terminal Railways, comprising Division 192 of the Amalgamated Association, served notice upon their company for reopening their agreement as of June 1, 1923. After a number of conferences with the officials of the company, the company offered an increase of 3 cents an hour over the scale then in effect, which was for traction division motormen and conductors and Key division brakemen, 46 cents for the first three months, 49 cents for the next nine months and 53 cents thereafter.

For Key division motormen and conductors the rates were 2 cents higher.

At a midnight meeting held on June 9 the men rejected the company's proposition and after several more meetings, when the company continued the same offer unchanged, the men by a referendum vote on June 27 again rejected the offer. The company then officially notified the men that they would be given a chance to reconsider their former decisions, but that if the company's offer was again rejected the next step would be arbitration. This led to the men's acceptance.

Strike Looms in New Jersey

Railway and Employees Fail to Agree Upon Means of Arbitration to Avert Walkout Threatened Aug. 1

"We are through holding the bag" said Thomas N. McCarter, president Public Service Railway, at a meeting with the Mayors of twenty-five New Jersey municipalities held at the Newark City Hall on July 26 to try to arrange a means of arbitration acceptable to both sides and prevent a strike next Wednesday. "If the men stop work we will not import strike breakers or try to run the cars. Of course, it is possible that the cars will eventually run again by means of court action, reorganization or the like, but I mean it when I say that we are through."

He at first declined to consider arbitration by any board except one having power to increase the company's revenue to correspond with any wage increase recommended, namely, the public utilities commission. Later Mr. McCarter said he would agree to an arbitration board consisting of one man chosen by each side and Harry V. Osborne, head of the utilities commission, as the third member. But he left the meeting abruptly after a verbal battle with the Mayor of Jersey City.

Prior to this meeting the men had submitted a demand for 30 per cent increase in wages after the termination on Aug. 1 of the existing agreement, as told in the ELECTRIC RAILWAY JOURNAL last week. The present rate is 50 cents an hour. The railway had refused to accept such proposal but had offered to continue the present scale for five years more. This offer in turn was unanimously rejected at meetings of the various local organizations of the union.

Arbitration by the public utilities commission had been suggested by the company and refused by the men. The latter had suggested the selection of an arbitration board of three, one to be chosen by each side and those two to select a third. The railway, however, had declined to participate in this plan.

In the hope of getting the two sides to agree upon a method of arbitration, Mayor Breidenbach of Newark called a conference of representatives of the various municipalities served by the railway, officials of the company and of the union, to meet on July 26. At this meeting Mr. McCarter explained fully his position. Increased taxation, paving charges never contemplated in the original franchises, and automobile competition, particularly bus competition, have placed almost insurmountable difficulties in the path of the company. No dividends have been paid since 1917, he said, and a deficit of more than $1,000,000 has been accumulated.

According to Mr. McCarter, the Public Service Railway has no money to pay the increase asked, and is unwilling to submit the matter to arbitration by a board which might recommend higher wages, but would have no power to provide means to pay them. Arbitration under the terms previously stated is therefore, the only method to which the company will consent. The union, however, feels that the public utilities commission would not have the courage to make an award in favor of the employees because it might then have to authorize an increase in fare or cut down competition.

No progress toward arbitration was made at the Mayor's meeting because neither side would recede from the position which it had taken. Mr. McCarter said that he saw only three possible ways for the controversy to end: a higher fare, elimination of bus competition, or the collapse of the railway. As a result of the failure of this meeting it appeared at noon on July 27 that a strike was almost inevitable on Aug. 1.

Extensive plans are already being made to meet the transportation crisis if the railway stops operation on that date. There are about 1,500 buses now operating in the territory served by the railway, approximately 425 being in the city of Newark. The maximum number of cars operated on the entire railway system is about 1,450, of which 600 are in Newark. It is planned to import additional buses from neighboring states, and by a system of short routings as well as by the elimination of bus layovers, it is hoped that fairly adequate emergency service may be provided. In fact, many look upon this, if the strike occurs, as a test of what the bus can do. The bus men in Jersey are in a far better position to undertake the task of supplying emergency transportation that was the case in connection with suspensions of railway service in Toledo, Bridgeport and Des Moines.

Report of Possible Change in Voltage Premature

Rumors have been current that the Chicago, Lake Shore & South Bend Railway Michigan City, Ind., plans to change over to 1,500 volt d.c. operation. The reports are based on the apparent necessity of the company conforming to the Illinois Central Railroad system of electrification for its terminal lines into Chicago. The Chicago, Lake Shore & South Bend has gathered some information of possible value to it in any study which it may make in the future, but it is not planning any such change at this time. In short, the matter is wholy tentative and of no consequence in so far as the present is concerned.

News Notes

Convention Date Announced.—The Amalgamated Association of Street Electric Railway Employees will hold a convention in Oakland, Calif., beginning Sept. 10.

Wages Advanced.—An agreement has been signed between the management and employees of the Berkshire Street Railway, Pittsfield, Mass., to run until June 1, 1924, which provides for a 7.2 per cent increase in wages, retroactive to June 1. Working conditions are unchanged by the new agreement, which was reached without resort to arbitration. Following the announcement of the agreement, General Manager C. Q. Richmond said there would be no movement at present to increase fares as a result of the wage advance.

Views on Municipal Ownership Aired.—The Columbus Railway, Power & Light Company, Columbus, Ohio, is running quite a conspicuous advertisement in all three daily newspapers of Columbus, entitled "Municipal Ownership." The advertisement tells the history of the Municipal Railway of Seattle right up to a short time ago, when the fare after being reduced was raised again to 10 cents upon the vote of the City Council to return to the former rate. The ad says that municipal ownership leads to government usurpation of private rights; it develops, in the long run, inefficiency and waste; it increases burdens of the taxpayers, destroys individual initiative, incentive and enterprise, and tends toward socialism.

Election Called Off.—The election which was to take place in Goldsboro, N. C., on July 9 to determine whether the city should take over and operate the street cars was recently rescinded at a called meeting of the Board of Aldermen. The city of Goldsboro has not had car service for several years, and more than once it was announced that an election would be held to determine just what would be done with the railway property. It was announced early in the year that the city had about $35,000 which could be used for the rehabilitation of the property from the sale of the old power plant and that the money was being held as a sort of trust fund. Later it was announced that the amount of money to be used for rehabilitation purposes had been increased to $40,000.

Increase of Five Cents an Hour.—A new wage scale was negotiated by the Milwaukee Electric Railway & Light Company with its employees which became effective on June 1. This scale represents an increase of 5 cents an hour for all hourly employees in the transportation department and increases were also granted to the monthly employees. This is the second increase in 1923, the wages being advanced 5 cents an hour on Jan. 1. All men employed since May 1, 1921, received this increase the first of the year. With that increase considered the scale up to June 1, 1923, was for conductors in city operation 45 cents for the first year, 47 cents for the second year, 49 cents for the third year and 51 cents for the fourth year and thereafter. For the motormen the wages in cents per hour were 50 cents for the first year, 52 cents for the second year, 54 cents for the third year and 56 cents for the fourth year and thereafter. Negotiations are conducted semi-annually, thus permitting frequent adjustment of wages and working conditions to meet increases or decreases in the cost of living.

Financial and Corporate

Oakland Lines Sold

Way Cleared at Receivership Sale for Reorganization of San Francisco-Oakland Terminal Properties

J. F. Schuman of San Francisco on July 17 bid in the property of the San Francisco-Oakland Terminal Railways at foreclosure sale for the sum of $10,000,000. No other bids were made and the sale was closed over the objections of E. P. Troy, San Francisco, claiming to represent a minority of the stock and bond holders.

The sale of the property is the last step but one in the reorganization plan which has been under consideration since 1919, when the State Railroad Commission recommended that the transportation system be placed on a "sound financial basis" before any adjustment of fares could be considered by the commission.

The property was purchased in the names of Hugh Goodfellow, Warren Olney and W. I. Brobeck, as joint tenants and agents of the reorganization committee. The sale was ordered under a decree granted by Superior Judge James G. Quinn foreclosing a mortgage held by the Mercantile Trust Company and the Union Trust Company on various bond issues of the company. The judgment was for $20,000,000.

FINAL STEPS SOON

The actual sale brought out a sharp conflict between Attorney Troy and J. B. Lanktree, commissioner named by the court to conduct the sale. Mr. Troy demanded that the lengthy decree of sale be read. This consumed fully half an hour. At the conclusion Mr. Lanktree called for bids and Attorney Schuman, on behalf of the joint tenants, bid $10,000,000. In payment of the bid Schuman offered three certified checks for the following amounts: $132,721.68, $132,721.67 and $132,721.27. He also added a list of stocks and bonds to make up the balance of the purchase price.

Following the sale, it was announced on behalf of the joint tenants that W. R. Alberger is named general manager and F. W. Frost, treasurer, to operate the properties, under the direction of the reorganization committee's agent. Mr. Alberger immediately issued an order appointing all former executive heads to the positions they had held. He also announced that all transportation forms bearing the name of the San Francisco-Oakland Terminal Railways would be honored pending the completion of the reorganization.

The final and last steps of the reorganization will be taken immediately when the new owners of the system will apply to the State Railroad Commission for approval of the details of the plans and the issuance of securities under the name of the Key System Transit Company. It is estimated that the first new issue will be for $10,000,000. Of this amount only such sum will be sold as will be needed to pay for one of the two new ferryboats recently purchased by the company, for such street paving as the company must do immediately, and such other expenses as cannot be cared for under the company's regular income.

Offer Made to Purchase Entire Common Stock

The West Penn Company, Pittsburgh, which some months ago bought a controlling interest in the Monongahela Valley Traction Company, Fairmount, W. Va., and changed the name to the West Penn-Monongahela Public Service Company, is now offering to buy all the common stock of the old company.

Under an agreement dated July 2, the company purchased from Senator C. W. Watson, on July 16, all his common stock in the West Penn-Monongahela Company. In accordance with his personal request the company now offers until Nov. 1, 1923, to all holders of common stock of the West Penn-Monongahela Company, the same opportunity to sell their stocks on identical terms and conditions.

Holders of record on July 16, 1923, of less than 100 shares will receive the full purchase price of $5 a share in cash. Holders of 100 or more shares of stock will receive $1.25 in cash for each share and certificates evidencing their right to receive the balance of the purchase in three equal annual payments on July 15, 1924, 1925 and 1926, with interest at the rate of 5 per cent per annum, payable semi-annually.

Dividend Tax Opinion Revised Again

Attorney-General Daugherty has rendered an opinion that "in cases where one corporation has received from another corporation distributions out of earnings or profits accumulated by such other corporations prior to March 1, 1913, or out of increase in value of its property accrued prior to March 1, 1913, the receiving corporation after having first distributed all of its earnings and profits accumulated since Feb. 28, 1913, may distribute to its stockholders exempt from tax, the amount so received by it from such other corporation."

Several months ago the Treasury Department issued a ruling to this effect and then rescinded it. It is said that the expression of opinion now made by the Attorney General will probably cause a restoration of the ruling.

Separation Planned

Staten Island Receivership to Be Lifted and Railway and Light Properties Separated

Plans were announced on July 21 for taking the Richmond Light & Railroad Company, Richmond, Staten Island, N. Y., out of the hands of the receiver. A letter sent to the stockholders and signed by J. H. Pardee, president of the company, said that the plans contemplate the division of the light company from the railroad company.

The directors have reached the conclusion that the most successful financing can be arranged by a separation of the lighting and railroad properties, each to be vested in a separate corporation, the lighting properties to be held by the principal corporation and the railroad properties by a subsidiary corporation. Moreover, under the present arrangement the company is subject to the overlapping jurisdiction of both the Public Service Commission and the Transit Commission. Accordingly, the Staten Island Edison Corporation has been organized to acquire the lighting properties.

The railway and ferry properties will remain in the possession of the Richmond Light & Railroad Company which will become a subsidiary of the Staten Island Edison Corporation. There is an alternate proposal by which the railway and the ferry property would be vested in a corporation already organized as the Richmond Railways, Inc., which also would be a subsidiary company of the Staten Island Edison Corporation.

Stockholders of the present Richmond Light & Railroad Company would get shares in the new Staten Island Edison Corporation on the basis of two shares of no par value for each share of the Richmond Light & Railroad Company stock. J. H. Pardee, president of the company, said:

> Preparation for the termination of the receivership are well under way, and it is hoped that an order of the Federal Court for the discharge of the receiver will be secured on or about Aug. 1. The termination of the receivership cannot, however, become permanently effective unless this company's indebtedness and receivership expenses are promptly paid. For this purpose bonds of the Staten Island Edison Corporation must be issued at once. Arrangements for the underwriting of the bonds have been practically completed.

Mr. Pardee announced also that a special meeting of the stockholders of the company would be held on July 31 to give the necessary statutory consent to the transfer of the lighting properties to the new company. Interests representing nearly 90 per cent of the stock have already signified their approval of the plan, President Pardee said. He further pointed out that the plan calls for no contribution from or assessment upon the stockholders, although they will retain their entire ownership in the property.

The Richmond Light & Railroad Company was formed in 1902 by a consolidation of the Staten Island Electric Railroad, the New York & Staten Island Electric Company and the Richmond County Power Company. It owns the entire stock of the New Jersey & Staten Island Ferry Company, and a majority of the stock of the Southfield Beach Railroad.

Captain John J. Kuhn was appointed temporary receiver for the company on April 28, 1920. On Oct. 5, 1922, new interests acquired a majority of the capital stock of the company with the expressed intention of taking it out of the hands of the receiver.

The transfer of the lighting properties and exchange of stock were authorized on July 12 by the Public Service Commission. The order of the commission also authorized the issuance of bonds of Staten Island Edison Corporation to provide funds for the payment of existing indebtedness and receivership and readjustment expenses, such bonds to be secured by a modern mortgage with flexible provisions for future issues. The Transit Commission had previously authorized the transfer of the railway properties to Richmond Railways, Inc.

Approval Sought for Extension of St. Louis Bonds for Three Years

Special Master Henry Lamm of the Federal court for the Eastern District of Missouri has set July 27 as the date on which he will hear further arguments on the application of Receiver Rolla Wells of the United Railways, St. Louis, to have $14,800,000 of the railway's obligations which become due Oct. 1 next extended for three years.

Opposition to the granting of the extension has been registered by security holders of the road. Judge Lamm instructed T. E. Francis, attorney for Receiver Wells, to prepare an order reviewing the arguments for the extension.

The hearing held on July 13 developed that the termination of the road's receivership scheduled for next October has been indefinitely postponed pending final outcome of the valuation case now before the Missouri Public Service Commission. Mr. Francis indicated that the matter probably would go to the United States Supreme Court.

Sam O. Jeffries, counsel for bondholders of the Suburban Railway, has opposed extension of any securities other than those issued by the receiver. Advocating reorganization of the road Mr. Jeffries stated it was the duty of the court to take the railway out of the hands of the receiver and let its owners operate it. He favored a "hasty reorganization."

Col. Albert T. Perkins, manager for the receiver, testified that while net earnings in May reached "$31,000 plus," June was not so good. The hearing developed that the railway has a reserve fund of $7,031,000. Asked if this sum could not be diverted to meet the road's obligations in part, Colonel Perkins said that would be "unfortunate,'" as this fund is and should be maintained to pay off claims for accidents and to settle similar liabilities.

Operation Ceases in Henderson

Railway operation ceased on July 17 when the Henderson Traction Company, Henderson, Ky., was placed in receiver's hands following the filing of a petition by the Ohio Valley Banking & Trust Company, trustee for the bondholders. The receiver, Henry P. Barrett, a bondholder and member of the State Board of Charities and Corrections, was appointed by Circuit Judge N. B. Hunt. The petition asked that the city of Henderson be requested to answer and set up its claim against its co-defendant and asked for judgment of $148,800 from the company with accrued interest on the bonds. It also prayed that a receiver be appointed by the court to take charge of the property described in the mortgage. The traction company has defaulted on the annual interest on the bonds for five years. The city holds a prior lien of $5,000, due as a street oiling tax against the company.

City commissioners on July 19 applied for a court order for the removal of rails and tracks on Second Street from Ingram to Clark Street and Green Street from First to Clay Street so that the city could start its own street improvement program.

The $25,000 insurance on the rolling stock of the company has been transferred to Henry P. Barrett, receiver.

The loss of the car line in Henderson has been expected now for some time. The action of the Court of Appeals on the paving question undoubtedly hastened the end. It decided that the company must pay for paving between the rails. The city commissioners then passed an ordinance covering the streets on which cars are operated ordering pavement improvements. When asked immediately after the passing of the ordinance what they intended to do, the railway officials said there was only one thing to do and that was to take up the rails.

Messrs. Tumulty and Choate Receivers of Jersey Road

Federal Judge Lynch, in Newark, N. J., on July 24 signed an order placing the Morris County Traction Company in the hands of temporary receivers. Joseph P. Tumulty of Jersey City, former secretary to President Wilson, and Joseph K. Choate, New York, president of the company, were named receivers.

Application for the receivership was made by the People's Savings & Trust Company, Pittsburgh, trustee. Consent to the receivership was given by Mr. Choate. The action is the result of a proceeding in equity on a bill of foreclosure in which the People's Savings & Trust Company was the complainant and several electric concerns were defendants.

According to an affidavit filed by Otto S. Schultz, secretary and treasurer of the company, the company is in default $6,100 interest on bonds; $65,102 for past due franchise and local taxes; $38,108.26 for this year's taxes; $15,000 for a judgment obtained against the company, and $26,000 in current bills. The cash on hand of the company is said to be $2,500.

The main line of the company runs from Maplewood to Wharton via Springfield, Summit, Chatham, Morristown, Morris Plains and Dover. There is a branch connecting Elizabeth and Springfield and another running from Dover to Lake Hopatcong. There are about 60 miles of track in the system. Competition from jitneys has been unusually keen in the territory served by the company.

Charlottesville Road Reported Sold

Control of the Charlottesville & Albemarle Railway, Charlottesville, Va., is reported to have passed to the Virginia-Western Power Company through the purchase of all of the common stock of the railway by the power company. The Charlottesville & Albemarle Railway was incorporated in 1913 as a consolidation of the Redland Power Corporation and the Charlottesville & Albemarle Railway. It has perpetual light and power franchises in both city and county. The railway franchise in the county is perpetual, but that in the city expires in 1944. For some time past the company has been controlled by Norman James, John L. Livers and their associates.

The property is a comparatively small one, but under the present management it has been unusually successful as a money maker for an undertaking of its size. It has outstanding $122,700 of 7 per cent cumulative preferred stock and $500,000 of common stock. There is outstanding against the property only one issue of bonds dated April 1, 1915, and due April 1, 1943. The trustee under the terms of the indenture securing the bonds is the Equitable Trust Company, Baltimore. The authorized amount of the issue is $750,000, but of this sum only $437,000 is outstanding at the present time.

It is understood that Mr. Livers, who has been vice-president and general manager at Charlottesville, will remain with the company in that capacity.

Maryland Property Merged with Capital Traction

After more than a year's controversy over leasing trackage, an agreement has been reached whereby the Kensington (Md.) Railway will pass from its present ownership and become part of the Capital Traction Company, Washington, D. C. A settlement with the Kensington Railway, the Sandy Spring Railway and the Capital Traction Company several times seemed near but was held up each time by objections of one or the other interested companies.

The Kensington Railway consists of 3½ miles of track and extends from Kensington and Sandy Spring to

Chevy Chase, connecting with the system of the Capital Traction Company at the District line. It has been in existence for about twenty-eight years.

The Capital Traction Company may establish through car service this summer from Kensington, Md., to the downtown section of Washington.

The proposal is for the Capital Traction Company to lease the Kensington Railway for ten years under certain conditions set forth in a contract now awaiting the signatures of the parties concerned.

John H. Hanna, vice-president of the Capital Traction Company, stated recently that the agreement should be closed within a few days unless some unforseen difficulty arises.

The plan is to have the Maryland Public Service Commission fix a rate of fare that will cover operating expenses and provide whatever surplus the commission regards reasonable. Of such a surplus, if any, the Kensington security holders would get 75 per cent and the Capital Traction Company 25 per cent.

New Orleans Earnings Decline

The report of the third quarter of the trial year of the Public Service, Inc.,—April, May and June—just submitted by the company to Paul H. Maloney, Commissioner of Public Utilities at New Orleans, shows a material reduction in the per cent of income earned by the company on the rate basis of $53,348,000, as of March 31, 1923. There has been a decline of $116,703, in the net operating income for the quarter just lapsed as against that of the three months previous, a contingency which was not, however, unexpected by the city on account of the closing of the schools for the summer and the departure of many people from the city for the country and seashore.

The report shows that $3,000,000 has been added to the base rate since the commencement of operations on Oct. 1, 1922, and further that $394,405 of the earnings during the past three months has been added to the base rate.

There has been set aside for the sinking fund, dividends and surplus reserve during the past six months the sum of $322,711, equivalent to 6.99 per cent on the present rate base of $53,348,000, which is about $3,000,000 in excess of the $50,000,000 rate base fixed when the company started in on the trial year to earn 7.50 per cent.

It is not apprehended by Commissioner Maloney that the company will be unable to earn this per centum on the rate base which will finally be adopted at the conclusion of the trial year.

The gross earnings in the railway department were $747,928; in the electrical department $641,835, and in the gas department $474,960.

Line to Be Abandoned.—The Berkshire Street Railway will shortly abandon the line from Great Barrington, Mass., to Sheffield and Canaan, Conn., and the tracks, poles and wires will be removed.

Equipment Trust Certificates Authorized.—The Department of Public Utilities of Massachusetts has approved an issue by the Milford & Uxbridge Street Railway of $52,249 of 6 per cent equipment trust notes.

Seeks Increase in Budget for 1924.—In its budget for 1924, filed with the City Council, the Seattle Municipal Railway asks $6,747,173, an increase of $163,861 over 1923, the increase charged largely to miscellaneous labor and supplies.

Appeal in October.—The appeal of the Philadelphia Rapid Transit Company from the Public Service Commission's valuation and 7-cent, four-for-a-quarter ticket fare case will be argued in the October term of the Superior Court in Philadelphia.

Net Income Decreases.—The Eastern Massachusetts Street Railway, Boston, Mass., reports a net income of $474,123 for the first six months of 1923. The figure for the same period a year ago was $506,191. Expenses and taxes increased from $3,962,890 in 1922 to $4,377,324 for the period from January to June, 1923.

Bond & Share Company to Increase Capital.—A special meeting of the stockholders of the Electric Bond & Share Company, New York, N. Y., has been called for Aug. 3 to vote on increasing the capital stock from $40,000,000 to $50,000,000 by the issuance of 50,000 shares of preferred and 50,000 shares of common stock of $100 per value of each.

Auction Sales in New York.—At the public auction rooms in New York on July 25 there were sold $3,000 of United Traction Company (Albany) 4½ per cent bonds, due 2004, coupons June and December, 46½ per cent; $25,000 Broadway & Seventh Avenue Railroad first consolidated mortgage 5 per cent gold bonds, due December, 1943, 62½ per cent.

Earnings and Passengers Increase.—The net earnings of the Boston Elevated Railway for the six months ended June, 1923, were $1,062,134, against $1,045,534 for the same period a year ago. There was an increase in the total passengers carried, 177,955,358 being the number for the first six months of 1922 and 195,051,019 for the same period of the current year.

Earnings Increase Under Restored Fare.—A gain in earnings of the Seattle Municipal Railway is shown in a check of receipts for the first fifteen days under the restored 8½-cent fare, as compared with a similar period last year. There were fewer passengers, but receipts were $257,274, an increase of $1,506. The discrepancy was due to a smaller number of school fares during the period this year.

Income and Passengers Increased.—For the six months ended June 30, 1923, the Philadelphia Rapid Transit Company realized a net income of $1,335,881. For the same period ended June 30, 1922, the sum was $1,299.707. There were 459,437,387 passengers carried from January to June, 1923, against 420,345,082 passengers carried for the same six months a year ago. The passengers revenue increased from $20,681,618 in 1922 to $22,150,187 for the first six months of 1923.

	Latest	Month Ago	Year Ago	Since War	
				High	Low
Street Railway Fares* 1913 = 4.84	July 1923 **6.92**	June 1923 **6.92**	July 1922 **7.04**	May 1921 **7.24**	May 1923 **6.88**
Street Railway Materials* 1913 = 100	June 1923 **171**	May 1923 **173**	June 1922 **172**	Sept. 1920 **247**	Sept. 1921 **156**
Street Railway Wages* 1913 = 100	July 1923 **212**	June 1923 **219**	July 1922 **210**	Sept. 1920 **232**	Apr 1923 **207**
Steel—Unfilled Orders (Million Tons) 1913 = 5.91	June 30 1923 **6.39**	May 31 1923 **6.98**	June 30 1922 **5.64**	July 31 1920 **11.12**	Feb. 28 1922 **4.14**
U.S. Bank Clearings Outside N. Y. City (Billions)	June 1923 **15.38**	May 1923 **15.58**	June 1922 **13.47**	Mar. 1920 **18.54**	Feb. 1922 **10.65**
Business Failures	June 1923	May 1923	June 1922	Jan. 1922	May 1923
Number	**1,378**	**1,467**	**1,660**	**2,722**	**1,467**
Liabilities (millions)	**52.00**	**31.77**	**39.59**	**105.7**	**31.77**

Conspectus of Indexes for July, 1923

Compiled for Publication in this Paper by

Albert S. Richey
Electric Railway Engineer
Worcester, Mass.

	Latest	Month Ago	Year Ago	Since War	
				High	Low
Eng. News-Record Construction costs 1913 = 100	July 1923 **222.1**	June 1923 **220.7**	July 1922 **169.7**	June 1920 **273.8**	Mar. 1922 **162.0**
U.S. Bur. Lab. Stat. Wholesale Commodities 1913 = 100	June 1923 **153**	May 1923 **156**	June 1922 **150**	May 1920 **247**	Jan. 1922 **138**
Bradstreet's Wholesale Commodities 1913 = 9.21	July 1 1923 **13.09**	June 1 1923 **13.38**	July 1 1922 **12.11**	Feb. 1 1920 **20.87**	June 1 1921 **10.62**
Dun's — Wholesale Commodities 1913 = 120.9	July 1 1923 **188.7**	June 1 1923 **191.4**	July 1 1922 **173.7**	May 1 1920 **263.3**	July 1 1921 **159.8**
U.S. Bur. Lab. Stat. Retail food 1913 = 100	June 1923 **144**	May 1923 **143**	June 1922 **141**	June 1920 **219**	Mar. 1922 **139**
Nat. Ind. Conf. Bd. Cost of living 1914 = 100	June 1923 **160.1**	May 1923 **160.3**	June 1922 **155.4**	July 1920 **204.5**	Aug 1922 **154.5**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population.

Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen and conductors on 105 street and interurban railways in the United States, operating more than 100 passenger cars each, and weighted according to number of cars.

Applies for Note Issue.—The Wisconsin Gas & Electric Company, Kenosha, controlled by the Wisconsin Edison Company, Inc., has applied to the Railroad Commission for authority to issue $400,000 of serial notes to pay in part the purchase price of the electric and gas plants of the Waukesha Gas & Electric Company.

Service Suspended.—The South Carolina Gas & Electric Company, Spartanburg, S. C., suspended practically all railway service at midnight on July 21. In announcing compliance with the order of the commission the company issued a statement explaining the operation of cars on the Glendale-Clifton line, the Saxon line and the operation of buses to make connections at East Spartanburg.

Stock Decreased.—Stockholders of the Montgomery Light & Traction Company have filed in the Probate Court a certificate decreasing the capital stock from $2,000,000 to $2,000 and the number of shares from 20,000 to 2,000. The resolution effecting these changes was adopted at a recent meeting in Montgomery. Early in the present year the company was taken over by the Alabama Power Company.

Grand Rapids Ran Slightly Behind in June.—The Grand Rapids Railway, Grand Rapids, Mich., failed by $3,451 to meet its expenses and make an 8 per cent return on its investment during June, according to its monthly report. This places the accumulated deficit in the equalization account at $16,301. Whenever the equalization account is short $50,000, or ahead $50,000, the fare will automatically increase or decrease.

Subsidiaries Merge.—The York County Power & Light Company and the Westbrook Electric Company have been consolidated with the Cumberland County Power & Light Company, Portland, Me., operating the Portland Railroad. The Cumberland property has for some time owned a majority of the stock on both the above-mentioned companies, although it has operated them under their own names. The merger has been approved by the Public Utilities Commission and became effective on July 1.

Applies to Issue Bonds.—Application to the Public Service Commission for permission to sell $6,000,000 of first lien and refunding mortgage gold bonds, 6 per cent series, was made recently by the Alabama Power Company. The bonds would be due in 1951. The company also applied for permission to issue $6,500,000 in first mortgage, 30-year 5 per cent gold bonds to be deposited with the United States Mortgage & Trust Company, under a mortgage and deed of trust dated June 1, 1921.

Tube Company to Pay Initial Common Dividend.—An initial semi-annual dividend of 2½ per cent has been declared on the non-cumulative preferred stock of the Hudson & Manhattan Railroad, payable on Aug. 15 to holders of record of Aug. 1. The directors have also declared the regular semi-annual 2½ per cent interest on the 5 per cent adjustment income bonds, payable on Oct. 1. The company operates between New York and New Jersey under the Hudson River and to Newark. Traffic has grown tremendously in recent months.

Wants Service Suspended. — The Pennsylvania Public Service Commission has been requested by the Mayor of Titusville, Pa., to order immediately the suspension of service by the Titusville Traction Company until the company properly bonds its rails. This action was taken after Mayor Archer had been shown by Fred Larson, city electrician, a section of pipe taken from lines within the water plant in the west end.

Five-Cent Fare Not Possible.—General Manager Dana of the Boston Elevated Railway recently issued a statement to the effect that a universal 5-cent fare was not possible until the entire deficit of the company was paid off. Further, that it was the intention of the company to turn over about $1,100,000 to twelve greater Boston cities and towns in liquidation of advances made by them to the company. This will be the second payment on the Elevated deficit of 1919 which originally amounted to $3,980,000. It will leave a balance of $2,362,000 to be paid back to the municipalities, as more than $500,000 was "paid on account" by the Elevated last year.

Arguments Heard on Valuation.—The Missouri Public Service Commission on July 19 heard arguments on motions filed by the United Railways, St. Louis, and the city of St. Louis for a rehearing of the railways valuation case. Thomas E. Francis, attorney for Receiver Rolla Wells, pleaded for a reopening of the case on the grounds that the valuation should have been fixed at $69,100,000 instead of $51,781,348, while Former City Counselor Henry S. Caulfield, on behalf of the city, contended the valuation should not have exceeded $30,414,241. He said that the company should have deducted more for depreciation and should not have allowed $2,700,000 in promotion costs. The commission has taken the matter under advisement.

Authorizes Point Gratiot Abandonment.—Commissioner Pooley of the Public Service Commission has granted the petition of the receiver for the Buffalo & Lake Erie Traction Company, operating an interurban line between Buffalo, N. Y., and Erie, Pa., for permission to abandon the so-called Point Gratiot line and portions of the local lines in the city of Dunkirk. The lines to be abandoned were operated by the receiver of the Buffalo & Lake Erie as part of the system of the Dunkirk Street Railway. The commission's decision permits the abandonment of all the franchises for tracks in the city of Dunkirk except those used by the interurban lines. The company has contended that the Dunkirk local lines and the so-called Point Gratiot line were not profitable and should be abandoned.

More Tokens Sold.—Since the Public Service Railway, Newark, N. J., was authorized by an injunction obtained in the Federal court to charge an 8-cent fare, the corporation has carried a total of 679,549,922 passengers, or a monthly average of 33,977,496. The number paying the base fare of 8 cents cash was 246,635,339, or a monthly average of 12,331,766. The remaining passengers, exclusive of school children, paid fares by tokens bought at the rate of four for 30 cents. The railway recently filed its twentieth monthly statement in the Federal court at Trenton showing a total of 35,317,061 passengers carried in June. Of this number 11,515,609 paid 8-cent fares. A compilation of all the statements indicates that at the close of June 803,030 more tokens had been sold than had been turned back.

Line to Be Reorganized.—The two one-man cars that the city of St. Louis purchased several years ago to operate over the St. Louis Municipal Bridge between St. Louis and East St. Louis, Ill., probably will roll over the tracks of the rehabilitated St. Louis & Jennings Railway. Plans are under way for a complete reorganization of this line, which recently suspended operations because of losses suffered in competition with jitneys. J. A. Jeorg, chairman of a committee of citizens appointed to work out plans for reopening the car line, has prepared plans for community operation of the line. A total of $75,000 would be raised to refit the line. Of that sum, $35,000 would be paid the present owner, Wayne J. Staedlin, who bought the line at a bankruptcy sale last March. The balance would be used as follows: $5,000 for grading, $11,000 for rails, $3,000 for ties, $2,000 for car repairs and $5,000 for labor. A further expenditure of $14,000 will be necessary to refit the Helen Avenue branch line.

Surface Lines Bondholders Would Foreclose.—The Equitable Life Assurance Society, New York, as holder of an issue of $1,500,000 of consolidated mortgage 4 per cent gold bonds of the Coney Island & Brooklyn Railroad, has asked the court to permit an action to foreclose the mortgage, the bond interest having been in default. The reorganization committee of the Brooklyn Rapid Transit Company made a tender of the interest on the bonds, and the company asked the court for permission to "accelerate" the principal, have it adjudged due and payable, and to bring a foreclosure action. The railroad and the receiver argued that the property was in the hands of the court and that the trustee under the mortgage had no right to accelerate the principal, in view of the receivership and of the tender of all the back interest. The accumulated interest due up to July 1 amounted to $270,000. The matter is now before the court. The Coney Island & Brooklyn's principal lines are the Franklin Avenue, Smith Street and De Kalb Avenue.

Traffic and Transportation

Ohio Buses Under Commission

Electric Railway Operatives Attend Conference at Columbus and Discuss Operating Rules

The so-called Freeman-Collister bus bill relating to the operation of buses in Ohio went into effect on July 27. As a result all intercity and local bus lines and all commercial trucking companies doing intercity hauling are compelled to secure certificates of convenience and necessity from the Utilities Commission and post bonds. There is an insurance clause in the new law. The license fees range from $40 to $240, graduated according to the capacity of the buses.

Under the new law bus lines and trucking companies which were doing business in the state prior to April 28, the date the bill was filed with the Secretary of State, were issued certificates of convenience without hearings, except where there were protests filed with the commission. Lines which were established after that date were compelled to file applications for such certificates.

In anticipation of the application of the new law, traction, steam railway, motor bus, commercial trucking and street railway men were invited to meet with members of the Public Utility Commission at Columbus on July 11 and 12, when the proposed regulations which are to be imposed by the commission under the new bill were discussed. The commission reserved to itself the right finally to approve a set of regulations after the Freeman-Collister bill is in effect, but the principal regulations to be imposed were decided upon at the meeting.

The decisions so far reached are all tentative, but copies of the regulations as finally adopted by the commission will be attached to each certificate of convenience to be issued by the commission to the motor bus and commercial trucking lines which operate under the provisions of the new law.

EIGHTY RULES WILL GOVERN OPERATION

About eighty rules in all, mostly of a minor regulatory nature, will govern the operation of the bus lines and truck companies. Principal among the regulations were safety measures, which were discussed at great length. The proper manner to approach and cross a railroad or interurban traction crossing was considered from all angles. It was agreed that passenger-carrying buses should come to a full stop before crossing a railroad right-of-way either inside the city or in the country. The matter of stopping at interurban traction crossings was left to the discretion of the commission, with the suggestion that the commission specify all such stops on the route to be traversed by the buses. It was also agreed that buses should pass crossings in second speed.

One rule of operation that will be written by the commission into its final regulations is that bus lines shall adhere faithfully to their schedules. Regular schedule trips will all have to be made on time, except for circumstances over which the operator has no control. Another rule upon which the commission will insist is that when a bus breaks down on the road it shall transfer its passengers to the next bus going in the same direction, whether that bus be operated by the same company or is run by a competing company.

Among the representatives of the electric railways who attended the meeting was John S. Bleecker, general manager of the Indiana, Columbus & Eastern Traction Company and head of the Dayton & Columbus Bus Transportation Company and the Columbus & Zanesville Bus Transportation Company, with offices at Springfield. According to Mr. Bleecker, the regulations so far agreed upon are for the most part practical ones which will be easy of enforcement.

Railway Agrees to Four Beeler Recommendations

Four items in the Beeler report, looking to changes in the railway system of New Orleans, which have been approved by resolution by the Commission Council, have been agreed to by A. B. Patterson, superintendent of the New Orleans Public Service, Inc. The changes will be carried out at once by the company without further parley. They are:

Rerouting of the Tchoupitoulas Street line across Canal Street to Esplanade Avenue and thence to Rampart Street.

Standardization on wide gage tracks throughout the city.

Extension of the Broadway line to Fig Street.

Preparation for the St. Claude Street line extension.

Several other matters in the Beeler report, some of which may require the granting of new permits and the cancellation of others, by ordinances of the Commission Council, are still under consideration by both counsel for the Public Service, Inc., and the City Attorney.

It is generally believed that the matters under discussion will be adjusted at an early date as some very important municipal work is being delayed until the questions in connection with the rerouting of the railway have been solved definitely.

Two-Mile Bus Line Operated by Pennsylvania Railway

The Beaver Valley Traction Company, New Brighton, Pa., of which W. H. Boyce is general manager, is now operating a bus line between Beaver and Vanport, Pa., a distance of a little more than 2 miles. The establishment of this service was brought about by the reconstruction of approximately 6,500 ft. of the local line of the Beaver Valley Traction Company. At the Vanport terminal of the line the road connects with the Steubenville, East Liverpool & Beaver Valley Traction Company, which operates through service from Steubenville and East Liverpool over the local line to Beaver. Local traffic in Vanport did not warrant going to any great expense to maintain service, but it was necessary to do so on account of the through traffic of the Steubenville, East Liverpool & Beaver Valley Traction Company.

In consequence the railway purchased two twenty-four-passenger Reo buses with McKay bodies at a cost of approximately 50 per cent of the amount necessary for a temporary track. Not only did this call for a smaller investment, but upon completion of the reconstruction the buses will be available for other uses.

No attempt has been made to compare revenue and operating expenses, inasmuch as the bus line is not replacing a street car line, but is being used to maintain a service from which the railway has a definite amount of revenue, namely, that received as its portion of the interurban traffic. In other words, the bus operation is purely an expense necessary to maintain the interurban traffic, but is an amount that would be less than would be occasioned if the railway company had resorted to the construction of temporary street car tracks.

Petitions for Municipal Bus System in Schenectady

The city of Schenectady, through Mayor Whitmyre and Common Council President Shay, on July 25 urged Governor Smith to convene the Legislature of New York State in extraordinary session for the purpose of authorizing the city of Schenectady to start a municipal transportation system to compete with the Schenectady Railway, whose cars are now running on all lines but are not patronized on account of the trolley strike. Schenectady's clamor for buses was added to that of Buffalo and New York when a resolution adopted by the Common Council of the electric city was presented to the Governor.

The Schenectady Council in its resolution alleges that the strike, bad service last winter and the fact that the railway is operating at a great loss, which "may prevent it from making needed extensions" to its lines, are sufficient reasons for it to be authorized to resort to the use of city-owned buses for transportation.

Jitneys in Birmingham Seek Relief

Petitions asking for an initiative election on the jitney question have been filed by the Jitney Owners & Operators' Association with the clerk of the City Commission of Birmingham, Ala.

City officials say an election will be called in the event all the requirements of the law have been met in the petitions. The first step to be taken by the City Commissioners is the verification of the names signed to the petition. An election must, however, be called or refused within thirty days from the date of filing the petition.

Meanwhile the temporary injunction restraining the city from putting the jitneys off the streets has been dissolved. E. D. McLendon, president of the City Commission, announced at once that the city would carry out its agreement with the railway commencing on July 22, the date the dissolution of the injunctions became effective.

In dissolving the injunction Judge Walker held as follows:

That the ordinance is within the city's police power.

That the petitioners have no inherent right to operate motor vehicles as common carriers over the streets.

That the motive of the commission in enacting the law cannot be questioned.

The initiative proceeding is an attempt on the part of the jitney operators to secure relief from the terms of a settlement made recently between the city and the Birmingham Railway, Light & Power Company which the operators of the autos consider unduly detrimental to their interests. Briefly the jitney ordinance recently enacted provides that jitneys cannot be operated on down-town streets within four squares of a railway line; that the jitneys must pay a city license of $100 a year, and that owners must take out an indenmity bond of $10,000. The terms of the city's agreement with the railway provide that fares be reduced from 8 cents to 7 cents cash with a ticket fare of 6¾ cents.

Agreement on Fare Extension

The Dallas Railway recently reached a fare agreement with the city whereby the 6-cent fare will be continued. The conditions under which the extension would be granted were reviewed in the ELECTRIC RAILWAY JOURNAL, issue of June 30.

Bus Restraining Order in Schenectady Will Be Argued

The right of a county judge to set aside an injunction order of the Supreme Court will be argued on July 28 before Supreme Court Justice Henry W. Borst at Amsterdam. The question grows out of the action of County Judge John J. McMullen of Schenectady in vacating the restraining order issued by Justice Edward M. Angell enjoining jitney operators from running automobiles in competition with cars of the Schenectady Railway.

Judge William M. Nicoll, who represented the jitney men and obtained the vacating order from Judge McMullen, has been served with an order to show cause before Judge Borst why the vacating order should not be set aside.

One paragraph states that "by reason of said unauthorized order of the county court of Schenectady, the plaintiff has sustained and will sustain great and irreparable damage and injury to his business."

The Emergency Taxicab Operators' Association announces that there are now 537 operating buses in Schenectady and along the interurban route of the Schenectady Railway. This number includes almost all of the jitney operators who are on regularly assigned routes.

Weekly Pass to Be Continued in Tacoma

At the conclusion of one year of using weekly passes on the Tacoma Railway & Power Company's lines, the company announces its intention of continuing the use of the pass indefinitely. The average fare for folks who used the pass during the year is 4.89 cents. The first week the passes were used 7,007 were sold. Since that time there has been a gradual increase, until the final week in the year showed 12,125 sold.

The average number of passes a week is 11,054; the average pass-rider uses his ticket for street car transportation 3.81 times a day, or 26.65. times a week, the figures show. For the year, a total of 574,805 passes and 15,282,232 rides on passes is stated. The highest number of rides per pass was registered the week of Aug. 21-27 last year. The average pass holder rode 28.20 times that week, at a cost of 4.62 cents a ride. The lowest normal week was Dec. 25-31, when the pass holders averaged 24.65 per pass.

All Night Service Ends. — All-night service, which has been maintained in New Castle, Pa., for many years by the Pennsylvania-Ohio Electric Company, has been discontinued.

Joker Bill Appears Again.—Under the terms of a bill introduced in the Senate of Georgia passengers riding on street cars, interurban cars or on railroad trains who are unable to secure a seat will be transported at one-half the regular rate of fare.

Two Cents a Mile to Continue.—Basing its decision on tentative appraisals and valuations fixed by the Commission for the Detroit United Railway and its system, the Public Utilities Commission recently directed a continuance of the 2-cents-a-mile rate of fare. The minimum fare will be 5 cents.

Will Decide Fare.—A hearing will be held on Aug. 1 before the California Railroad Commission to determine the rate of fare to be charged by the Fresno Traction Company. The company is now operating on a 6-cent fare and the commission will decide whether the company must return to the old rate of 5 cents or continue at the higher rate.

Wants Fare Lowered.—Mayor Frederick W. Donnelly of Trenton, N. J., expects to introduce a resolution before the City Commission authorizing the City Counsel to take up with the Public Utilities Commission the matter of asking the Trenton & Mercer County Traction Corporation to reduce its fare from 8 to 7 cents and eliminate the 1 cent charged for transfers.

Six Cents in Minneapolis.—Hearings on the Minneapolis Street Railway fare issue were to be resumed the end of this month. Early in June the State Railroad & Warehouse Commission adjourned hearings, which meant the continuation of the 6-cent fare for another few months. The hearings were deferred in order to permit the valuation experts for the city and the company to return to Denver, where a similar hearing was taking place.

Authorizes Continuation of Eight-Cent Fare.—The Public Service Commission of New York on July 19 authorized the Fonda, Johnstown & Gloversville Railroad to continue the 8-cent fare in Amsterdam for an indefinite period. The city sought to have a 5-cent fare re-established in June, when a prior fare restriction waiver expired. The company, in its testimony before the commission, showed that for the four years and four months, 1919 to 1923 (four months) inclusive, a deficit occurring in each year except in 1922 in the operation of the lines in Amsterdam.

May Reroute Entire System.—An announcement has been made by the Tri-City Railway of its plan to reroute the entire railway system in Davenport. The officials of the company are to appear before the Davenport City Council and ask permission to begin the undertaking. If the plan meets with the approval of the city officials the company will start immediately to reroute practically every line in the city. Officials of the railway company claim that if the new plan is approved it will mean a reduction in the cost of operation for the company and the improvement of service. It is expected that the city officials will approve the plan. The cost to the company of carrying it out is estimated at $400,000.

The 100-Mile Strip Plan Extended.—Owing to the success of the 100-mile strips sold since June 1 at $1.25 on the 16-mile Clinton line of the Terre Haute, Indianapolis & Eastern Traction Company, E. M. Walker, general manager of the Terre Haute division, has extended the plan to the three other lines of the division effective July 11 within Indiana and Aug. 10 between Indiana and Illinois points. The company had already made use of low rate round-trip tickets good for ten days as an effective answer to jitney competition. However, these did not take care of people who had to board the vehicles at crossroads. The mileage strip on the Clinton line promptly produced a 2¼ per cent increase in revenue without any particular change in the industrial conditions of the territory.

Personal Items

B. C. Adams Installed

New Executive at Toledo Has Assumed Duties of President and General Manager There

Benjamin Cullen Adams has assumed his duties as president and general manager of the Community Traction Company, Toledo, and also as vice-president and general manager of the Toledo Edison Company, succeeding Frank R. Coates in both places and as active executive of the Doherty interests in Toledo.

Mr. Coates spends practically all of his time at the New York offices of Henry L. Doherty & Company, having been called there to assume important duties soon after the death of Frank Frueauff, partner of Henry L. Doherty. Mr. Coates still retains the presidency of the Toledo Edison Company and is a director of the Community Traction Company.

B. C. Adams

The new traction executive at Toledo is one of the original Doherty cadets, having entered the employ of the Madison Gas & Electric Company, Madison, Wis., as soon as he was graduated from the University of Wisconsin in 1903. He was born at Madison in 1880. While he is one of the youngest men in the executive ranks of the Doherty operating organization he is one of the oldest in point of service. His preliminary schooling was secured in the public schools of his home city.

Mr. Adams was sent to Lincoln, Neb., as general superintendent of the Lincoln Gas & Electric Light Company, after he had familiarized himself with everything about the Madison company. At that time the plant in Lincoln was obsolete and unable to take care of the requirements. Mr. Adams was instrumental in getting the plant back on a paying basis and was made manager in 1909. In the summer of 1913 he was ordered to Spokane, Wash., to take charge of the Spokane Gas & Fuel Company, where he remained for nine months.

Next Mr. Adams was sent to São Paulo, Brazil, to make extensive investigations and reports on a big utility property there for Ellis & Company, bankers of London, and remained there most of the time until the fall of 1914, when war broke out and he was recalled to the United States. The boat on which Mr. Adams and his family were scheduled to sail was *spurlos versenkt* and no word was heard from them for weeks. Finally they landed at New York on Christmas Day and explained that at São Paulo they had missed the boat that was sunk and had sailed by the next steamer.

His next connection was with the Montgomery Light & Water Power Company, Montgomery, Ala., where he remained for a year and a half until transferred to the management of the Empire District Electric Company, at Joplin. In January, 1920, he was shifted to St. Joseph as successor to James H. Van Brunt in management of the St. Joseph Railway, Light, Heat & Power Company.

Mr. Adams went to Toledo on June 19, this year, from St. Joseph and soon thereafter was formally elected to his present executive capacity in the Doherty properties there.

Mr. Adams has associated with him in the traction management J. Franklin Johnson, as vice-president and general superintendent of the Community Traction Company, and in the power and lighting business Ferd J. Derge, as vice-president and assistant general manager of the Toledo Edison Company.

J. L. Gould, who has been master mechanic for the Wilmington & Philadelphia Traction Company and the Southern Pennsylvania Traction Company, has tendered his resignation and will on Aug. 1 become associated with the street railway sales department of the Texas Oil Company. Mr. Gould received his first electrical training several years ago in the Schenectady N. Y., and Lynn, Mass., shops of the General Electric Company and later was transferred to the Philadelphia office of the same company. He afterward was appointed master mechanic for the Reading Transit & Light Company, which position he held for several years, leaving Reading to become master mechanic in Wilmington, Del., and Chester, Pa. Mr. Gould has taken an active interest in the work of the American Electric Railway Association. He is a past-president of the Keystone Railway Club and at the present time is serving on the equipment committee of the American Electric Railway Engineering Association.

George Kidd President

Excellent Record of British Columbia Official Recognized by Board of Directors

George Kidd, general manager of the British Columbia Electric Railway, Vancouver, has been elected president of the company by the board of directors at a recent meeting in London, England; W. G. Murrin, assistant general manager, has been made vice-president, and A. T. Goward, manager of the Vancouver Island system, has been made vice-president at Victoria.

These changes are the result of the recommendations of Sir Ernest M. Harvey, who made a recent visit to the company's properties in British Columbia, so that the titles of the executive officers would more clearly define their powers and responsibilities. No change in duties will take place, Mr. Kidd remains in charge of the company's entire policies and holds power of attorney from the board of directors in London and Mr. Murrin remains in charge of the actual operations on the mainland of British Columbia and Mr. Goward in charge of operations on Vancouver Island.

George Kidd

George Kidd, the new president of the company, has long been associated with the British Columbia Electric Railway, having been both in the offices in London and in British Columbia. He was appointed secretary to the company in connection with its London work in January, 1908. Later he was made comptroller and removed to Vancouver. This position he held until 1914, when he was appointed general manager to succeed R. H. Sperling. One of his fairly recent accomplishments was the acquisition of the Western Power Company of Canada, which system has been amalgamated with the mainland system of the British Columbia Electric Railway.

Mr. Kidd was at one time honorary vice-president of the Canadian Electric Railway Association. He is a member of the National Electric Light Association, the American Electric Railway Association and the Canadian Electrical Association.

Frank R. Phillips Acting Manager at Pittsburgh

Frank R Phillips, superintendent of equipment of the Pittsburgh Railways since 1910, has been appointed acting general manager for the receivers of the company, succeeding the late P. N. Jones. Mr. Phillips has long been connected with electric railway work, but heretofore his activities have been confined very largely along engineering lines.

Previous to 1910 he was master mechanic of the Cleveland City Railway. He entered the service of that company in 1894 after leaving high school. He advanced gradually with this company until he became a foreman and then master mechanic of the company. In 1903 on the consolidation of the local lines in Cleveland he became connected with the Cincinnati, Newport & Covington Railway.

Later he served with the Michigan United Railway and the Ohio Brass Company. In July, 1908, he returned to Cleveland as master mechanic.

New General Superintendent at Zanesville

John William Hewitt has been appointed general superintendent of the Columbus, Newark & Zanesville Traction Company, with headquarters in Zanesville, Ohio. He is a railway man of many years experience. A native of Nottingham, England, he moved to Australia when a youth and began his career as a motorman on the New South Wales government tramways at Sidney. On the outbreak of the Boer War he enlisted in the New South Wales bushmen and was in the thick of the campaign in South Africa. At the conclusion of hostilities he came to the United States, where he secured employment with the Seattle Electric Company. He remained with this company from 1902 to 1908, rising to the position of superintendent of employment.

In 1908 Mr. Hewitt was called to the Portland Railway, Light & Power Company at Portland, Ore., as superintendent of interurban lines, retaining this post until 1914, when he went to the Sumpter Valley Railroad, a steam road in southern Oregon, as superintendent. He remained in the capacity just mentioned until 1916, when he went east to Reading, Pa., as superintendent of railways with the Reading Transit & Light Company. After a year's service with the Reading company he returned to the Sumpter Valley line as general manager, continuing in that capacity until he became connected with the Columbus, Newark & Zanesville as general superintendent.

The post which Mr. Hewitt will fill in Ohio was formerly combined with the general superintendency of the Indiana, Columbus & Eastern Traction Company, held by C. C. Fast, but the increasing duties made it necessary to separate the two offices, Mr. Fast continuing with the Indiana, Columbus & Eastern. In addition to the interurban lines between the cities named, the Columbus, Newark & Zanesville properties also include the city systems in Newark and Zanesville and the light and power business in the latter system.

J. T. Hambleton General Manager at Warehouse Point

J. T. Hambleton, who has been appointed general manager of the Hartford & Springfield Street Railway, with offices at Warehouse Point, Conn., was born in Quakertown, Bucks County, Pa., on Oct. 25, 1874. He was educated in the public schools of that town. He began his electric railway experience in Allentown, Pa., in 1894, and has been in that work almost continuously since that time, being for some years with the Lehigh Valley Transit Company's lines in various capacities. After several years of track and shop work he became in 1900 superintendent of construction for the Bethlehem Construction Company, having charge of the work on the Dayton, Springfield & Urbana and other routes. At this time he built the Slate Belt Transit Company line, of which he later became the controlling owner. This road was first run by the Lehigh Valley system, but became an independent road in 1911. From 1911 to 1916 Mr. Hambleton was general manager of the Wilmington Southern Traction Company. Gaining control of the Slate Belt Transit Company in 1916, he was made president and general manager, with headquarters at Pen Argyl. This office and interest he still retains.

H. W. Plummer resigned recently as general manager of the Asheville Power & Light Company, Asheville, N. C. He has gone to Europe for a three months trip to study general business conditions. Mr. Plummer remains a member of the board of directors for the Asheville company.

George D. Yeomans was appointed counsel of the Brooklyn-Manhattan Transit Corporation at a meeting of the board of directors on July 16. He succeeds Carl M. Owen, counsel during Lindley M. Garrison's receivership of the Brooklyn Rapid Transit Company, with which Mr. Yeomans was long connected as counsel.

Eugene Betts has been promoted to assistant consulting engineer of the Southern Pacific Company, at New York. He has been assistant engineer with the company for several years since the war, during which he was a major in the construction division of the army. Mr. Betts was formerly with J. G. White & Company, Ltd., as director and general manager of railway and power properties in Central and South America.

J. J. Vaughan has been appointed master mechanic of the Memphis Street Railway. Since 1905 he has been associated with this property, entering the mechanical department on May 4 of that year. Since then he has served in every branch of this department and was general foreman for several years. In 1900, after serving for three years in the Louisville & Nashville shops at Decatur, Ala., he became connected with the mechanical department of the Birmingham Street Railway.

S. E. Mason of San Antonio has joined the staff of the San Diego Electric Railway as superintendent of equipment. He will have charge of all equipment, way and structures and of the bonding and welding departments. Mr. Mason is a graduate of the University of Texas and has had considerable experience in that state as an electric railway man. For the past six years he has been with the San Antonio Public Service Company and had charge of the reconstruction lines in San Antonio.

C. S. Walters has succeeded Harry W. Plummer as vice-president and general manager of the Asheville Power & Light Company. Since 1913 he has been district manager of the Pacific Power & Light Company's gas and electric properties in the Walla Walla Valley. Prior to that he had been general manager of the Walla Walla Valley Railway and was later elected vice-president. Before going to Walla Walla Mr. Walters was general agent for the Oregon Electric Railway with headquarters at Salem, Ore. Mr. Walters' early connections were with steam railway operation.

Obituary

J. A. McCampbell

John A. McCampbell, for the last eighteen years a valued member of the Stone & Webster organization, died recently. Mr. McCampbell's varied experience in building and operating public utilities soon created a wide demand for his services as an efficency engineer, and he instituted betterment operation in power plants at Houston, Dallas, El Paso, Fort Worth, Key West, Jacksonville, Seattle and Bellingham. When Stone & Webster were called upon by the Buffalo General Electric Company to build a large steam plant on the Niagara River, Mr. McCampbell was brought from Dallas to supervise the installation of mechanical equipment. From Buffalo he went to Philadelphia as general superintendent on the construction of a 100,000-kw. plant for the Philadelphia Electric Company.

Mr. McCampbell entered the employ of Pepper & Register, engineers and electric railway contractors at Philadelphia, in 1892 and remained with them until 1898, when he was employed by the South Shore & Boston Street Railway and later by the Massachusetts Electric Company as chief engineer of power stations at East Braintree and Quincy Point. In 1901 and 1902 he was chief engineer of power stations for the Houghton County Street Railway at Hancock, Mich., and was connected with several other utilities up to the time he entered the employ of Stone & Webster on Dec. 1, 1906. He was born in Knoxville, Tenn., in 1873.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

G. E. Completing Heavy Electrification Work

Important heavy electrification work for seven railroads is nearing completion in the Erie works of the General Electric Company.

Three 120,000-lb. 600-volt freight locomotives are being prepared for shipment to the Bethlehem Chile Iron Mines. A special feature of these locomotives are four offset trolley poles, two on each side of the locomotive, for collection from trolley wires along the side of the track, used for maneuvering on docks close to the water edge. These units will also be equipped with two 600-ft. cable reels for use on sidings or spurs and where no overhead trolley is available. They are of the steeple-cab swivel-truck type, length 37 ft. 4 in., height 11 ft. 11 in. They will also be equipped for dumping cars with compressed air.

Two 120,000-lb. 600/1,500-volt freight locomotives for the Sacramento Northern Railway are now in assembly. These resemble the locomotives intended for the Bethlehem Chile order described above with the exception of the offset trolley poles and cable reels.

The largest order in process of manufacture includes ten 150-ton 3,000-volt locomotives for the Mexican Railway, Ltd. It is expected that the first of these will be ready for test about Aug. 15.

High-speed tests of the locomotive ordered by the Paris Orleans Railroad are expected to be held next month. This locomotive, now nearly completed, will be a 120-ton machine of special construction operating at 1,500 volts with gearless motors and equipped with two three-axle driving trucks, a two-axle guiding truck at each end and two box cabs. It is 62 ft. long. Speeds in excess of 90 m.p.h. are expected.

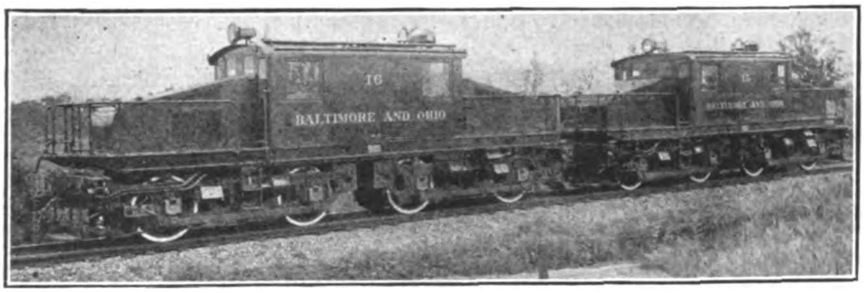
Two 120-ton 600-volt electric locomotives have recently been shipped by the General Electric Company for use in the Baltimore tunnel of the Baltimore & Ohio Railroad. They are of the steeple-cab type with with articulated trucks and each is equipped with G-E-209 motors. The length of the locomotives inside knuckles is 39 ft. 6 in., length over cab 33 ft. 6 in., height over cab 12 ft. 4 in., over-all width 10 ft. The operating cab is 15 ft. x 10 ft.

A feature of the construction is that buffing and hauling stresses are carried through the truck side frames and an articulated joint, thus entirely eliminating these strains from the cab and platform. Multiple-unit control and four third-rail shoes are provided.

These locomotives have been designed for a speed of 17 m.p.h. with train of 1,200 tons and 14 m.p.h. up a 0.5 grade. The tractive effort is 21,600 lb.

For the Toledo Edison Company, a swivel-truck type switching locomotive with a 750-ft. cable reel is being made. This will be equipped with multiple-unit control and combined straight and automatic air brakes.

A 50-ton 600/1,200-volt locomotive is under construction on order of the Portland Railway Light & Power Company for the Williamette Valley Southern Railway.



STEEPLE-CAB, ARTICULATED-TRUCK LOCOMOTIVES FOR B. & O. TUNNEL

Trade Associations Helpful

The trade association as a means for the promotion and self-regulation of industry has become an important American business institution, according to Herbert Hoover, Secretary of Commerce, under whose direction a book has recently been published on this subject. Generally speaking the public is little acquainted with its scope and activities. The constructive purposes of these organizations have unfortunately been confused with the minority of activities which have sometimes been used as a cloak for action against the public interest.

All trade association activities are not good, according to the Secretary, just as all individual habits are not good until so proved by their reaction on the individual and the community. The purpose and aim of a trade association is to deal with all questions of general application in the branch of industry or commerce it serves, and so to develop its field that the enterprises in it may be conducted with the greatest efficiency and economy. Among the outstanding examples of substantial constructive endeavor may be listed the preparation of statistics, simplification, standardization and the elimination of waste, industrial and commercial research.

Study of Oil Prices Carried Back Sixty-four Years

Interesting figures are given by the Atlantic Refining Company, Philadelphia, showing the average price of Pennsylvania crude oils per gallon at the wells for the last sixty-four years. The figures were obtained from a number of different sources and it is possible that some slight variation exists in the method of figuring the average price in different years. Several sharp fluctuations occurred during this period. Present consumers will view with regret the extremely low prices that prevailed for many years. There may be some slight satisfaction, however, to be found in the fact that the price today is slightly lower than it was a few years ago.

Year	Average Price	Year	Average Price
1859	$20	1891	$0.66
1860	9	1892	.55
1861	* .50	1893	.64
1862	1	1894	.83
1863	3	1895	1.22
1864	9.15	1896	1.19
1865	6.87	1897	.78
1866	3.59	1898	.91
1867	2.74	1899	1.29
1868	3.41	1900	1.35
1869	5.53	1901	1.21
1870	3.89	1902	1.23
1871	4.34	1903	1.59
1872	3.64	1904	1.62
1873	1.83	1905	1.39
1874	1.17	1906	1.59
1875	1.35	1907	1.74
1876	2.56	1908	1.78
1877	2.42	1909	1.64
1878	1.09	1910	1.33
1879	.85	1911	1.30
1880	.94	1912	1.60
1881	.85	1913	2.46
1882	* .85	1914	1.82
1883	1.05	1915	1.56
1884	.83	1916	2.50
1885	.88	1917	3.25
1886	.71	1918	3.97
1887	.66	1919	4.12
1888	.87	1920	5.96
1889	.94	1921	3.33
1890	.86	1922	* 3.25

* Estimate based on incomplete figures.

Metal, Coal and Material Prices

Metals—New York	July 24
Copper, electrolytic, cents per lb	14.625
Copper wire base, cents per lb	17.50
Lead, cents per lb	6.30
Zinc, cents per lb	6.46
Tin, Straits, cents per lb	39.625
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$5.625
Somerset mine run, Boston, net tons	2.625
Pittsburgh mine run, Pittsburgh, net tons	1.95
Franklin, Ill., screenings, Chicago, net tons	1.675
Central, Ill., screenings, Chicago, net tons	1.45
Kansas screenings, Kansas City, net tons	2.625
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	$7.00
Weatherproof wire base, N. Y., cents per lb.	18.75
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N. Y., per gal	$1.03
White lead, in oil (100-lb. keg), N. Y., cents per lb	11.85
Turpentine, (bbl. lots), N.Y., per gal	$0.98

Rolling Stock

Illinois Power Company, Springfield, Ill., has placed an order with Nic Le Grand, Inc., for seven "positive" safety equipments.

Dubuque Electric Company has given a contract to Nic Le Grand, Inc., to convert six cars to modern one-man cars with safety features.

South Carolina Gas & Electric Company, Spartanburg, S. C., has placed an order with the Bell-Brown Motor Company to furnish buses in Spartanburg following the order of the commission to suspend trolley service. The buses will each have a capacity of twenty-five passengers.

Hudson & Manhattan Railroad, New York, N. Y., has let a contract for twenty-five cars to the American Car & Foundry Company. The construction of these cars begins at Berwick this week. These cars are to be just like the twenty-five cars obtained in 1922 and the twenty-five cars obtained in 1921, making seventy-five cars ordered during the last three years.

Dallas Railway has just placed an order with the J. G. Brill Company for thirty double-truck Peter Witt type cars, the electrical equipment for each of which will consist of four G.E.-265 motors and G.E. C.P.-27 air compressors with standard safety features. The Dallas Railway recently reached a fare agreement with the city of Dallas as a result of which it agreed to purchase these new cars.

Track and Line

Paducah Electric Company expects to improve 19 miles of trackage at an expenditure of approximately $30,000.

Memphis Street Railway is relaying trackage on South Third Street in the vicinity of Union Avenue. Track improvements are being made in other parts of the city.

Pittsburgh Railways will spend $657,800 for repairing tracks and freight stations and for purchasing new motors and a grading shovel. Judge Gibson in the United States District Court recently approved the report of the special master allowing the receivers to spend this amount.

Lewistown & Reedsville Electric Railway, Lewistown, Pa., will improve its line by the making of a double-track system from Burnham Junction to Lewistown proper. A survey is now being conducted by engineers in the employ of Day & Zimmermann.

New York State Railways, Utica, N. Y., will construct a single-track service line along James Street in Utica, starting from the end of the present James Street line and running easterly to the intersection of St. Vincent and James Streets. The Public Service Commission has approved the improvement.

Seattle Municipal Railway will start work immediately on an undertaking which will cost $45,000. It involves the installation of a "grand central" at the north end of the Fremont bridges. The complicated network of trackage was turned out by the Bethlehem Steel Corporation. The installation of this piece of special work will require two months to complete.

Northern Texas Traction Company, Fort Worth, Tex., will spend more than $400,000 in track improvements and extensions in Fort Worth. The contract has been awarded to Stone & Webster, Inc., for paving and double tracking part of Forest Park Boulevard, a 3-mile extension to Riverside line and a 3-mile extension to Oakland division through Sycamore Heights to the city limits.

Department of Street Railway, Detroit, Mich., has advertised for a lot of drop-forged steel single-curve pullovers, and also for drop-forged steel double-curve pullovers. The carbon in these appliances is limited by the specifications to between 0.15 and 0.25 per cent. The forgings are to have a minimum strength of 60,000 lb. per square inch, and be galvanized according to the Department of Street Railway specifications 105021521, which corresponds to the American Electric Railway Engineering Associations' standard specifications of D f 2 b.

United Railways, St. Louis, Mo., will require a court order to extend the Natural Bridge line westward from its present terminus on Kings Highway to Pine Lawn to connect with the Kirkwood-Ferguson line. A petition to this effect has been filed with the United States Federal District Court by the city of St. Louis, North St. Louis Business Men's Association and the Natural Bridge Industrial District Association. The estimated cost of the extension is $175,000.

Charleston Interurban Railroad, Charleston, W. Va., will defer its plans to remove its rails from State Street and to lay a double track on Summers Street to the Lovell Street extension of Washington Street. City Manager Wise of Charleston ordered the plans held in abeyance because in his opinion the filling required when Lovell and Washington Streets were joined has not settled sufficiently to support the weight of street car traffic. The company is engaged in making numerous repairs to paving at various points in Charleston.

Springfield (Mass.) Street Railway has been granted a franchise to loop a single track through Broadway, Pynchon and Water Streets at the eastern end of Hampden County Memorial Bridge. A franchise had been granted previously for a double track through Vernon Street, to establish on outlet from the Bridge to Main Street, and this was approved by the State Public Utilities Commission June 20. Action on the Pynchon Street loop settles a prolonged controversy, and prompt action will be taken in the matter of establishing the designated connections.

Trade Notes

Commercial Indian Agency of Lahore, Punjab, India, is anxious for agency connections for any kind of machinery or other merchandise.

General Electric Company, Schenectady, N. Y., has received an order for fifty interurban car equipments from the Pacific Electric Company, Los Angeles, a Southern Pacific property. Four G.E.-240, 110-h.p. motors with P.C.-12 control will be furnished.

National Pneumatic Company, New York, N. Y., announces that A. Frank Paul, in charge of the company's office in Philadelphia, and Oscar A. Broten, Western representative in charge of the Chicago office, have been appointed direct assistants to the general sales manager and will aid in the supervision of all sales matter.

Sherwin-Williams Company, Cleveland, Ohio, recently announced that L. F. Mullen had accepted a position with its insulating materials department and had been appointed sales insulation engineer for the eastern district. Prior to July 1, Mr. Mullen was connected with the Westinghouse Electric & Manufacturing Company in the insulation section at East Pittsburgh and at St. Louis.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. has supplied the Northern States Power Company with two new model extra long Westinghouse underfeed stokers for its St. Paul plant. These double-roll clinker grinder stokers have hollow forced draft agitating mechanisms which facilitate fuel-bed control and give active fuel-burning surfaces, non-clinkering extension sidewall tuyeres and large coal hoppers. The Alemite lubricating system is used on these stokers.

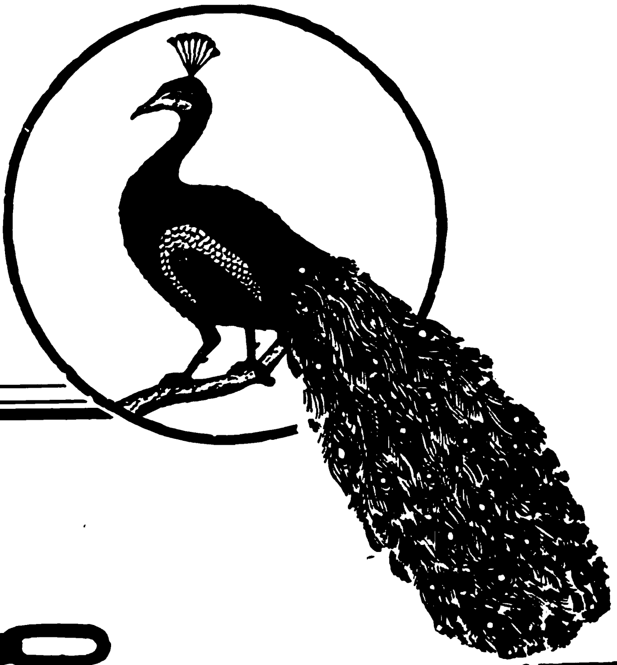
Boston Elevated Railway has placed an order with the Union Switch & Signal Company for a complete a.c. electro-pneumatic interlocking plant of fifteen levers, to be installed at the east end of the East Boston tunnel. This double-track tunnel has heretofore been operated with surface cars only, but it is now being changed over for multiple-unit trains, and seventy electro-pneumatic automatic stops have been ordered from the Union Company for this service. The construction work will be carried out by the signal department of the Boston Elevated Railway.

New Advertising Literature

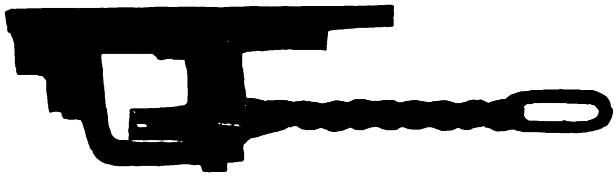
Chausse Oil Burner Company, Detroit, has issued a circular describing its oil-burning tool and surface heaters for repairing asphalt pavements.

Ramapo Ajax Corporation, Hillburn, N. Y., has issued a sixty-four-page booklet concerning switches, frogs and special work of every description. Various "Racor" switches are illustrated.

PEACOCK UNITES
Power - Speed - Capacity



The eccentric does the trick!



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have three essential qualties

It may be fast and powerful, but if it has not ample chain winding capacity, a hand-brake is practically useless. A little extra chain will not interfere with the efficacy of a Peacock Brake, because the large drum has plenty of room to accommodate all that can be wound up.

Great speed of chain winding at the start, followed by increasingly powerful pull as the radius shortens—these are the other attributes afforded by this unique application of the principle of the eccentric.

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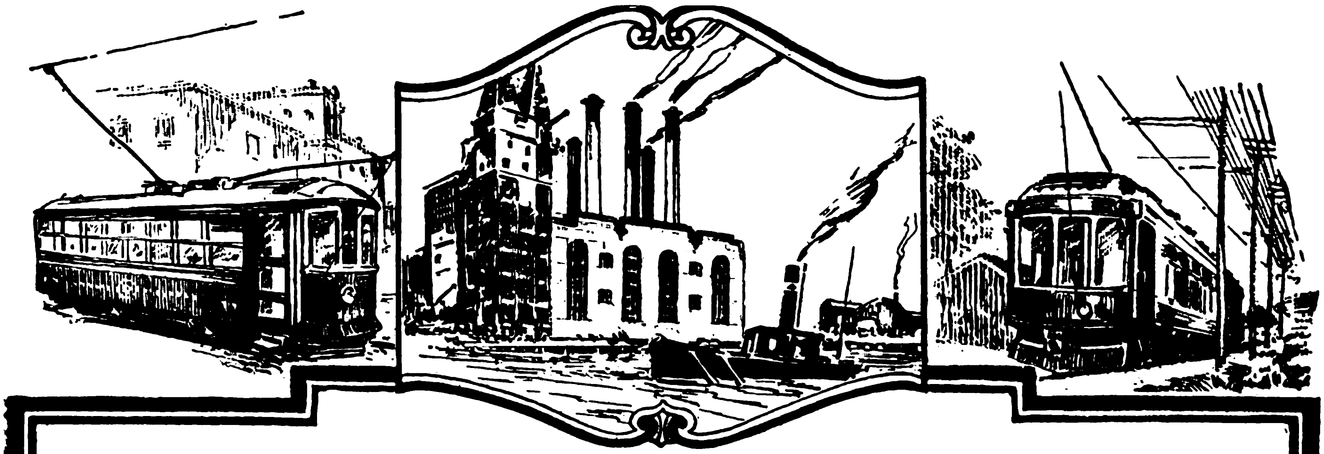

When We Say: "Every" We *Mean* Every

You, who have been reading our announcements, have seen the statement "There is a Texaco Lubricant for every purpose."

May we ask you to consider what that statement means to the Electric Railway Industry?

It means that: Many roads are using Texaco Lubricants all along the line.

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(Bearings, gears, compressors, brake mechanism, car doors, engines, etc.)

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Sometimes an unusual condition requires an unusual oil, and Texaco is ready.

For instance, recently a road found great difficulty in lubricating the bearings of a track welding machine. They called on us; we supplied a grease that stood up under the heat and allowed them to operate the welder continuously on two applications of grease per week with satisfaction, where three a day formerly had been unsatisfactory.

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We could multiply instances and they would all prove our point, which is—Texaco is successfully lubricating every type of machine in almost every industry in the world.

Texaco has successfully lubricated Electric Street Railways for millions of car miles.

With a background like this you can ask Texaco to lubricate anything and everything. We know how. And we have the lubricants. There IS a Texaco Lubricant for every purpose.

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Make Your Armature Good for another ten years—

Irv-O-Slot insulation consists of a layer of varnished cambric and one or more layers of fibrous paper solidly cemented together. Thicknesses from 12 mils to 30 mils. Dielectric strength of from 500 to 700 volts per mil.

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Irvington Black Varnished Cambric has a 30% higher dielectric strength, 100% better heat resistance, 100% more alkali and acid resistance, 200% Better Aging Qualities, 200% more resistance to oil than yellow varnished cambric. It is ideal for winding coils.

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As its share in the development of the electric railway industry, it has established a corps of lubricating engineers especially trained in solving the problems of the industry. This staff of engineers has developed oils and greases which meet exactly all requirements.

These products are always absolutely uniform and consequently the results obtained through their use are uniform. There are motor and car journal oils, compressor oils, controller oils and gear greases for your rolling stock and there are also curve grease and trolley grease.

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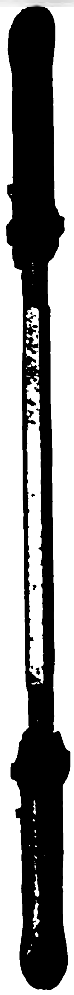

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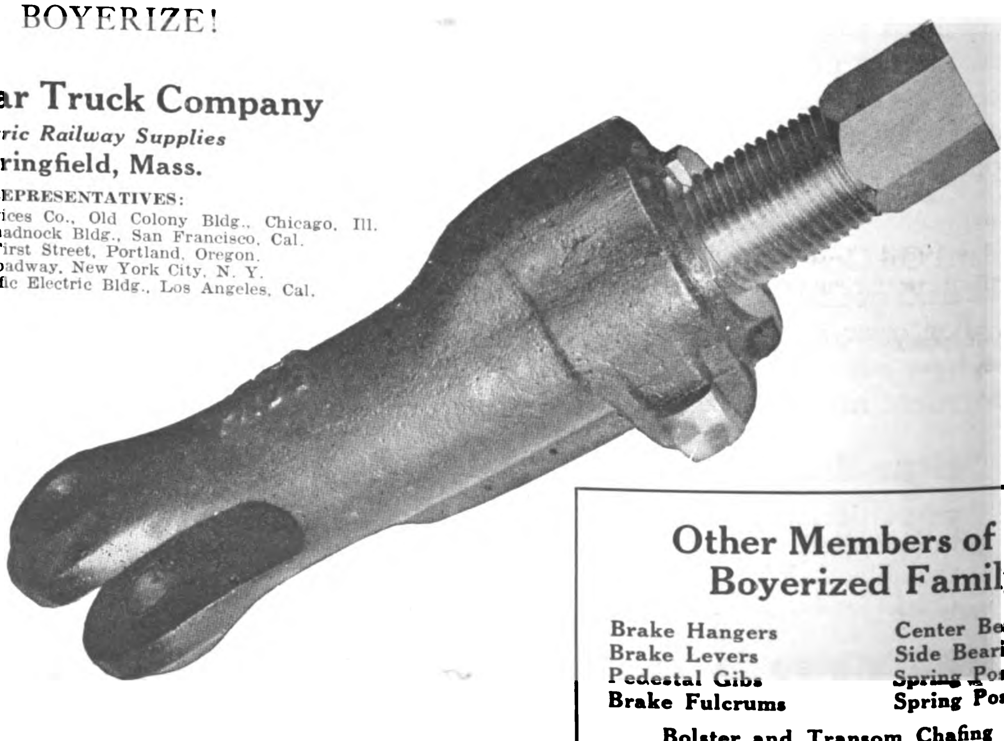

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The thoroughly modern plant of the Fisk Tire Company at Chicopee Falls, Mass., is equipped with five Edge Moor Boilers totalling 3746 H. P.—doing their part to keep the plant efficiency at the high level demanded by Fisk standards.

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EDGE MOOR, DELAWARE

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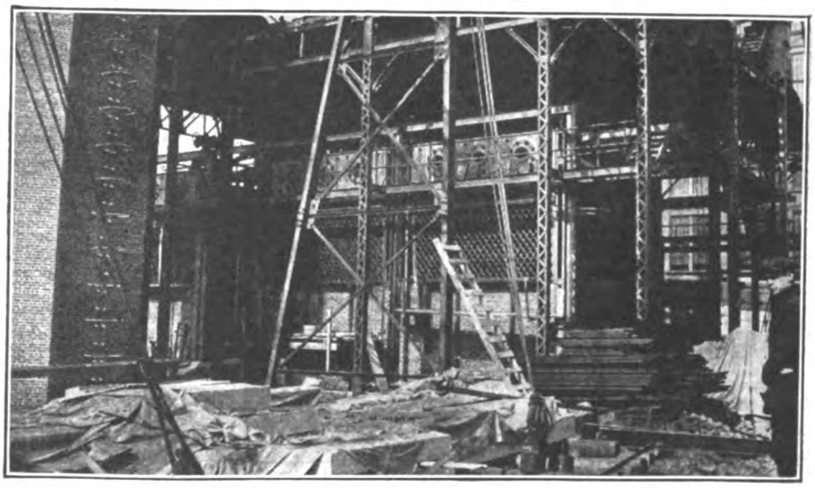
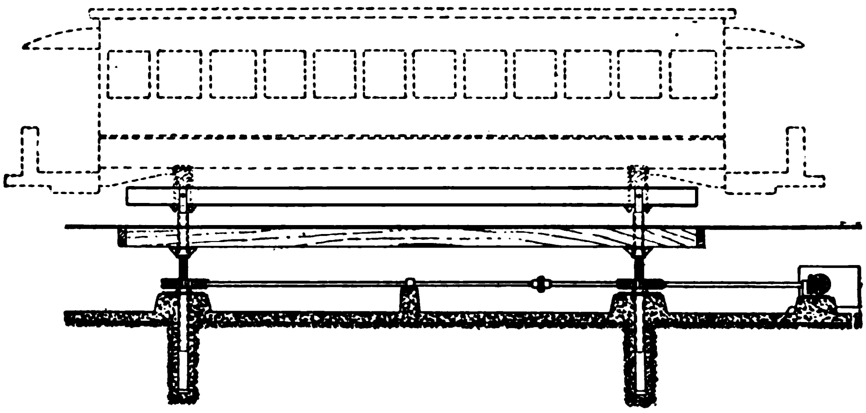


Power house of the Fisk plant at Chicopee Falls, and Edge Moor Boilers in course of erection.

EDGE MOOR Water Tube BOILERS

FOR INCREASED FUEL ECONOMY



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It makes car hoisting easy and because of its speed of operation, saves workers' time as well as affording absolute safety to men in the pit, and to equipment.

It can be operated by a discarded electric motor.

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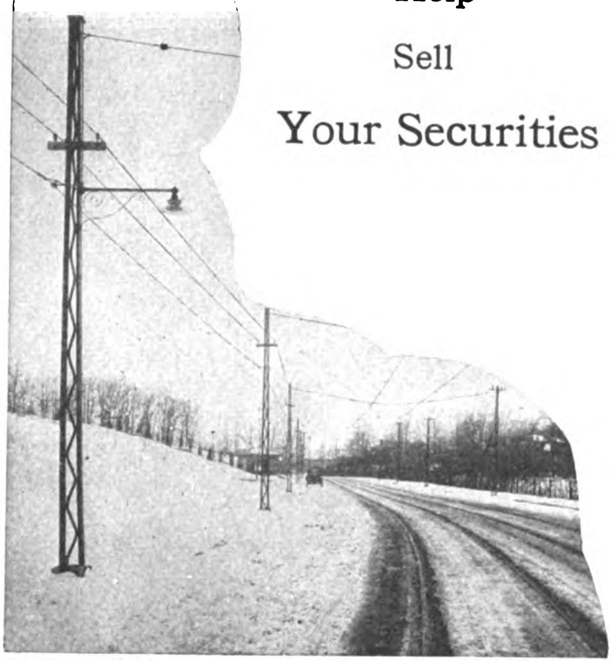

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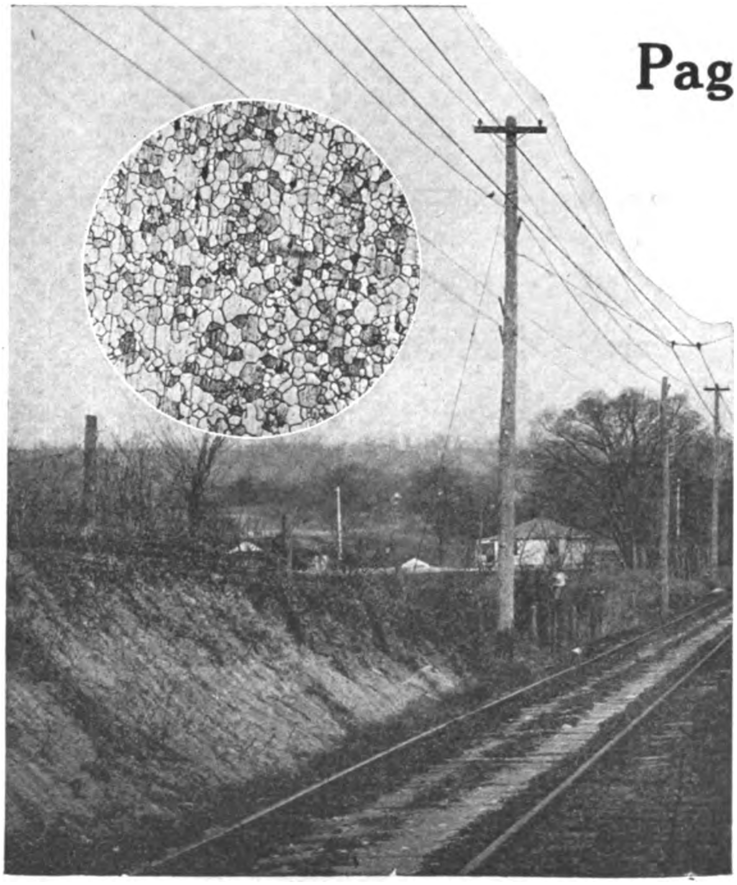

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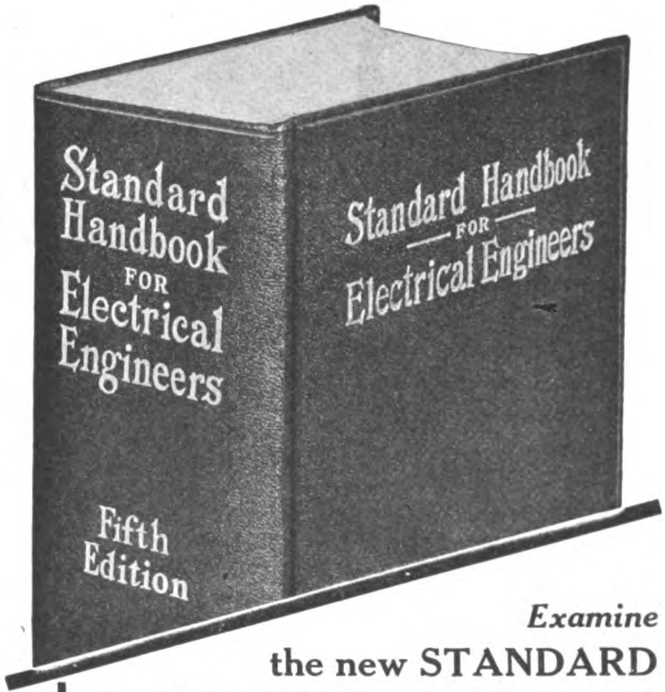

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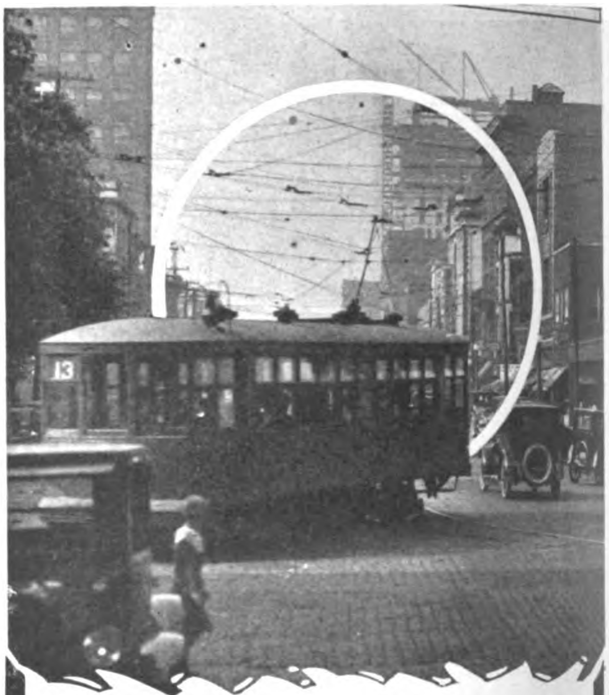

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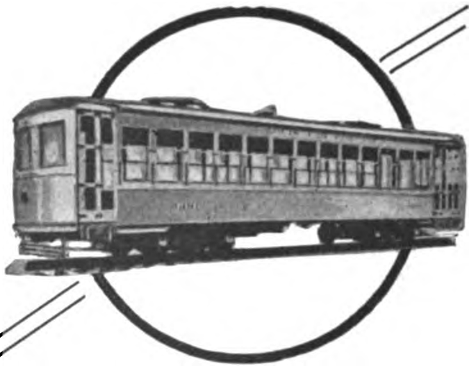

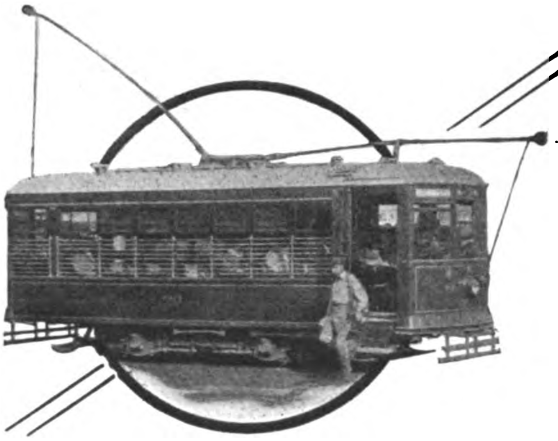

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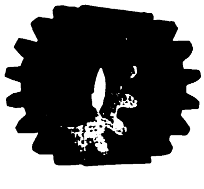

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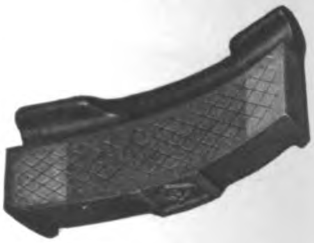

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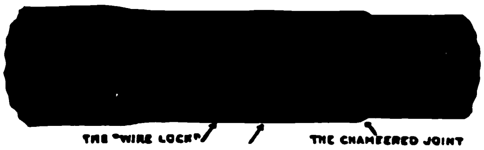

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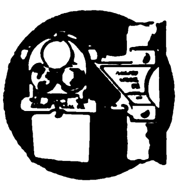

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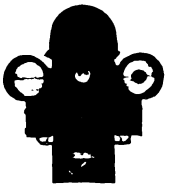
TROLLEY WIRE
ANACONDA COPPER MINING COMPANY
Conway Building, Chicago, Ill.
THE AMERICAN BRASS COMPANY
General Offices: Waterbury, Conn.

INSULATED WIRES AND CABLES
JOHN A. ROEBLING'S SONS CO., TRENTON, NEW JERSEY

Peirce Forged Steel Pins
For Railway Feeders
Designed for heavy duty and has the advantage that it cannot be pulled out of the cross arm.
HUBBARD & COMPANY
Pittsburgh Chicago



U. S. ELECTRIC AUTOMATIC SIGNAL
for single track block signal protection
United States Electric Signal Co.
West Newton, Mass.

Chapman
Automatic Signals
Charles N. Wood Co., Boston

Shaw Lightning Arresters
Standard in the Electric Industries for 35 years
Henry M. Shaw
150 Coit St., Irvington, Newark, N. J.

AETNA INSULATION LINE MATERIAL
Third Rail Insulators, Trolley Bases, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches
Albert & J. M. Anderson Mfg. Co.
289-93 A Street Boston, Mass.
Established 1877
Branches—New York, 136 B'way
Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St.
London, E. C. 4, 38-39 Upper Thames St.

American Rail Bonds

CROWN
UNITED STATES
TWIN TERMINAL
SOLDER
TRIPLEX

Arc Weld and Flame Weld

Send for new
Rail Bond Book

American Steel & Wire Company
CHICAGO
NEW YORK

BARBOUR-STOCKWELL CO.
205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of
Special Work for Street Railways
Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

SPECIALISTS
in the
Design and Manufacture
of
Standard—Insulated—and Compromise Rail Joints

The Rail Joint Company
61 Broadway, New York City

The Baker
Wood Preserving Company
CREOSOTERS
Washington Court House, Ohio

Cross Ties Bridge Timbers
Lumber Posts
Piling

Treated and Untreated

We solicit your inquiries

Creosoting Plant located
Washington Court House, Ohio
On—Penna. R.R., B. & O. R.R., D. T. & I. R.R.
Operating Mills in Southern Ohio

High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
IMPROVED ANTI-KICK BIG-HEEL SWITCHES
HARD CENTER AND MANGANESE CONSTRUCTION

New York Switch & Crossing Co.
Hoboken, N. J.

International Creosoting & Construction Co.
Galveston, Texas
Plant—Texarkana Beaumont Galveston

MONEY SAVERS TO RAILWAYS

Treated railway ties, poles, piling, bridge timbers, etc.

See our full page advertisement in last week's issue.

Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY
Johnstown, Pa.

Sales Offices:
Atlanta Chicago Cleveland New York
Philadelphia Pittsburgh
Pacific Coast Representative:
United States Steel Products Company
Los Angeles Portland San Francisco Seattle
Export Representative:
United States Steel Products Company, New York, N. Y.

Series Type

Arc Welding and Bonding Outfit

Rugged series resistance coil
Indestructible Mica insulation
Normal welding current at half voltage

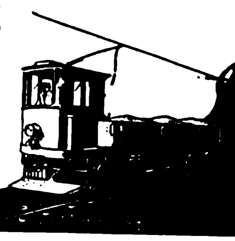
The Electric Railway Improvement Co.
Cleveland, Ohio

ERICO RAIL BONDS

The Differential Car

An automatic dump car, an electric locomotive, a snow plow, and a freight car—all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation.

The Differential Steel Car Co.
Findlay, Ohio



WHARTON

Special Trackwork

For Street and Steam Railways

Steel Castings **Gas Cylinders**

ORIGINATORS OF
Manganese Steel Trackwork

WM. WHARTON JR. & CO., Inc.
Easton, Pa.

Other Plants:
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.
Tioga Steel & Iron Co., Philadelphia, Pa.
Philadelphia Roll & Machine Co., Philadelphia, Pa.

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

Builders since 1868 of Water Tube Boilers of continuing reliability

BRANCH OFFICES
BOSTON, 49 Federal Street
PHILADELPHIA, North American Building
PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
TUCSON, ARIZ., 21 So. Stone Avenue
DALLAS, TEX., 2001 Magnolia Building
HONOLULU, H. T., Castle & Cooke Building
PORTLAND, ORE., 805 Gasco Building

WORKS
Bayonne, N. J.
Barberton, Ohio

Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893

BRANCH OFFICES
DETROIT, Ford Building
NEW ORLEANS, 521-5 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 705-6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, Royal Bank Building

Lapp Insulators
Lapp Insulator Co. Inc. LeRoy, N.Y.
Trade Mark

STANDARD

WIRES, CABLES AND CABLE ACCESSORIES
Manufactured by STANDARD UNDERGROUND CABLE CO.
Boston, New York, Philadelphia, Washington, Pittsburgh, Chicago, Detroit, St. Louis, San Francisco

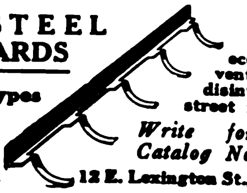
GODWIN STEEL PAVING GUARDS

Adapted to all types of rails and paving.

Proven by service to economically prevent seepage and disintegration of street railway paving.

Write for Illustrated Catalog No. 20.

W. S. GODWIN CO., Inc. 12 E. Lexington St., Baltimore, Md.



RAMAPO AJAX CORPORATION

Ramapo Automatic Return Switch Stands for Passing Sidings
RACOR
TRADE MARK
RACOR Tee Rail Special Work.
Manganese Construction

GENERAL OFFICES: HILLBURN, NEW YORK
Chicago New York Superior, Wis. Niagara Falls, N. Y.
Canadian Ramapo Iron Works, Ltd., Niagara Falls, Ont.

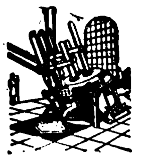
TAKE
ONE
T.L.T.

OHMER FARE REGISTERS
FOR ONE MAN CARS

Ohmer Indicating and Recording Fare Registers apply correct business methods to the sale of electric railway transportation.

OHMER FARE REGISTER CO.
Dayton, Ohio, U. S. A.

BUCKEYE JACKS
high-grade R. R. Track and Car Jacks
The Buckeye Jack Mfg. Co.
Alliance, Ohio



MOORE RAPID 'LECTROMELT FURNACES
MAKE YOUR OWN STEEL AND IRON CASTINGS
WHEN AND AS YOU NEED THEM
PITTSBURGH ELECTRIC FURNACE CORPORATION
Largest Maker of Arc Furnaces in the World
PITTSBURGH, PA.

"Make it of Vul-Cot Fibre"

NATIONAL VULCANIZED FIBRE CO.
WILMINGTON DELAWARE

ALLIS-CHALMERS
MILWAUKEE, WIS. U.S.A.

Electrical Machinery, Steam Turbines, Steam Engines, Condensers, Gas and Oil Engines, Air Compressors, Air Brakes

Car Seat and Snow Sweeper *Rattan*

For 60 years we have been the largest importers of rattan from the Far East. It is therefore to be expected that when Rattan is thought of, our name, "Heywood-Wakefield," instantly comes to mind.

Follow that impulse and write us when in the market for:

High Grade close woven Rattan Car Seat Webbing, canvas lined and unlined, in widths from 12 in. to 48 in.

High Grade Snow Sweeper Rattan in Natural and Cut Lengths.

High Grade Car Seats, cross or longitudinal, covered with Rattan, Plush or Leather.

HEYWOOD-WAKEFIELD COMPANY
Factory: Wakefield, Mass.

SALES OFFICES:
Heywood-Wakefield Co. 516 West 34th St., New York
Heywood-Wakefield Co. 1415 Michigan Ave., Chicago
E. F. Boyle, Monadnock Bldg., San Francisco, Cal.
F. N. Grigg, 630 Louisiana Ave., Washington, D. C.
Railway and Power Engineering Corp., Toronto and Montreal
G. F. Cotter Supply Co., Houston, Texas

TULC
A
LUBRICANT

We make a specialty of
ELECTRIC RAILWAY LUBRICATION
We solicit a test of TULC
on your equipment
The Universal Lubricating Co.
Cleveland, Ohio

75% of the electric railways use
B-V Punches
Send for Catalog
BONNEY-VEHSLAGE TOOL CO., Newark, N. J.

A Single Segment or a Complete Commutator
is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

Hale & Kilburn Seats

Suitable types for any kind of railway car or motor bus.

Neat
Light
Strong
Simple

Steel Seat
Light
Weight

It will pay you to consider Hale & Kilburn Seats for your new cars on the basis of (1) Passenger comfort, (2) Attractive appearance, (3) Lower maintenance.

Let us submit quotations

Hale & Kilburn Corporation
American Motor Body Co., Successors
***Works:* PHILADELPHIA**

NEW YORK
30 Church St.

CHICAGO
McCormick Bldg.

LOS ANGELES
447 E. 3d St.

ST. LOUIS
Theresa and Clark Aves.

ATLANTA
Candler Bldg.

FRISCO
71 First St.

For Increased Patronage

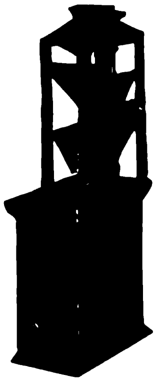
Even though Books of Globe Tickets are not sold at reduced rates, people will buy them in order to save handling change.

SOUTHWEST MISSOURI RAILROAD CO.
100
Detachable
Five Cent
Share Coupons
Five
ES 1923
Five

When a single purchase will provide tickets enough for a month or two— think what that means to patrons, and to you! And think how much time will be saved on the cars because the conductor does not have to make change.

Nearly everybody likes the book idea. Try it out on your lines, and check up on the results.

GLOBE TICKET COMPANY
116 N. 12th Street, Philadelphia, Pa.
Los Angeles New York San Francisco



CLEVELAND FARE BOXES

always

Fit the Fare and Fare Collection System

The Cleveland Fare Box Co.
Cleveland, Ohio
Canadian Cleveland Fare Box Co., Ltd.
Preston, Ontario

193
IN
10224

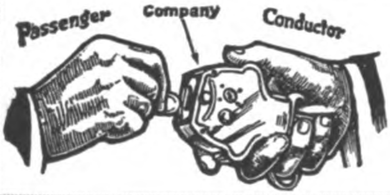
Type R-10

International Registers

Made in various types and sizes to meet the requirements of service on street and city system. Complete line of registers, counters and car fittings.

Exclusive selling agents for HEEREN ENAMEL BADGES.

The International Register Co.
15 South Throop Street, Chicago, Illinois



Direct Automatic Registration By the Passengers

Rooke Automatic Register Co.
Providence, R. I.

SAMSON SPOT WATERPROOFED TROLLEY CORD

Trade Mark Reg. U. S. Pat. Off
Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent
SAMSON CORDAGE WORKS, BOSTON, MASS.

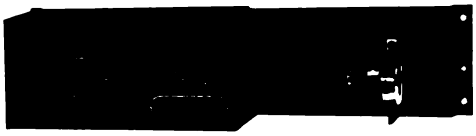
PS HEATERS

Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company
1725 Mt. Elliott Ave., Detroit, Mich.

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



No. 478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

Things We Have Always Known

The recent business condition has brought to the forefront of thought many fundamental considerations that have always been known but have been damned with faint praise.

Human nature in the mass is very much like human nature in the individual. One of its dominant characteristics has been summed up in the observation, "You never miss the water till the well runs dry." We never appreciate fundamental things until we have occasion to do without them.

This observation has a special application to the Demand of the public for the products of industry. While the Demand was at high tide and everybody was busy trying to supply that Demand at a profit no one, seemingly, gave a thought to where the Demand came from, how long it might last, or what would happen if it should fail. We merely assumed the permanent existence of the Demand, just as we assume the presence of water, air, and fire.

But a day came when Demand began to subside, and in many industries it came almost to a full stop. And then we missed it, and realized, as never before, what an important thing it was. And we began to inquire where it came from in the first place, and how it might be restored.

We always knew—everybody knew—that Desire for things made a Demand for them in the market. That people desired things we accepted as an elemental fact. But when we discovered that Desire fluctuated we began to appreciate that Desire, as we know it, is a thing created by the art of man. It is a highly specialized form of an elemental need—just as a Louis XVI chair is made out of a tree.

This discovery led to another equally important discovery that the means of refining and specializing that Desire was Advertising. The gigantic work that has been accomplished by modern advertising now stands out in bold relief. It has been the means by which the refinements of civilization have been made known and made desirable, and this desire has been made into Demand. It is a simple fact that a million profitable forms of industrial activity owe their very existence to the fact that Advertising upheld the standards of living which in turn provided the demand for their products.

[Published by *Electric Railway Journal* in co-operation with The American Association of Advertising Agencies]

POSITIONS WANTED

A FORMER Eastern man, now connected with a Western road, with seventeen years' railroad experience, fourteen years with a large agency from operative to executive, now desires a connection either as special agent or assistant to special agent. Know the inspection game from end to end including labor, arbitration, employment; superintendent, etc. Some road somewhere needs a man of my type, one that went through the old days and has never learned the new days as far as hours are concerned, as my middle name is still work. PW-583, Electric Railway Journal, Rialto Bldg., San Francisco, Calif.

MASTER mechanic, city or interurban railways; experienced on all branches; good record; good references; available after Aug. 1. PW-582, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of transportation, with a proven successful record of nineteen years on city, suburban and interurban properties, solicits correspondence with managers who are in need of a capable, efficient superintendent; successful in dealing with public and labor; recognized as an operating official who gets results; at present with large property; personal reasons for desiring a change. High grade references furnished as to ability to take over any property and get results. PW-568, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

SHOP superintendent; fourteen years' experience in all branches, on city and interurban equipment; good record and best of references. PW-581, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

FOR SALE

20—Peter Witt Cars

Weight Complete, 33,000 lbs.

Seat 53. 4—G. E. No. 258-C Motors. K-12-H Control, West. Air Taylor Trucks. R.H. Type. Complete.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

FOR SALE

1200 tons 70 lb. A.S.C.E. **Relaying Rails**, and 300-400-500 K.W.H. 25 Cycle **Rotary Converters.**

Receiver, Interurban Railway & Term. Co.
1112 2nd Nat'l Bank Bldg., Cincinnati, O.

WANTED

TRACK SCALE

Second hand
of standard make, minimum sixty ton per section and 50 foot weigh rail length, in first class condition.

R. B. Campbell, Gen'l Mgr.
The Arkansas Valley Interurban Ry. Co.
Wichita, Kansas

The Searchlight Advertising in This Paper

is read by men whose success depends upon thorough knowledge of means to an end—whether it be the securing of a good second-hand piece of apparatus at a moderate price or an expert employee.

The Best Proof

of this is the variety of this journal's Searchlight ads. Without a constant and appreciable *demand* for such machinery or services, by its readers, the market-place which these advertisements represent could not exist for any length of time.

Are *you* using the
Searchlight Section

FOR SALE

New Light Weight

One Man—Two Man
Double End—Double Truck

SAFETY CAR

Seating Capacity 54

Fully Equipped

Immediate Delivery

F. S. 5 0 Electric Railway Journal
10th Ave at 3 th St., New York

FOR SALE

25-Ton All Steel

BALDWIN ELECTRIC LOCOMOTIVE

Fully Equipped

Excellent Condition

Immediate Delivery

FS-566. Electric Railway Journal
10th Ave. at 36th St., New York City

FOR SALE

3—J. G. Brill One Man Safety Cars

Equipped with 2 G. E. No. 67 Motors, G. E. B23 Controls 35 ft. long, single truck, good condition.
Immediate shipment. Further information on request.

WEST VIRGINIA UTILITIES CO.
MORGANTOWN, W. VA.

New Motor Repair Parts

IMMEDIATE SHIPMENT

We have in stock virtually every part necessary to complete all of the types of non-interpole motors. They are new and were manufactured by either the Westinghouse Company or the General Electric Company. They may be purchased at 20 per cent less than the manufacturers' present prices.

Send your orders to us and deduct 20 per cent from the current quotations.

What have you for sale?

TRANSIT EQUIPMENT CO.
Cars—Motors
501 Fifth Avenue, New York.

WANTED TO PURCHASE

SECOND HAND EQUIPMENT

CLOSED TRAILERS

Two-side entrance, with seating capacity approximately 50 people, steel structure preferred and equipped with air-operated doors, air-brake equipment, electric heaters and for standard gauge.

W-579. Elec. Railway Journal.
Real Estate Trust Bldg., Philadelphia, Pa.

Good Relaying Rails

Are as Serviceable as New Rails, with a Big Saving on the Price

We have ready for prompt shipment First-Class Relaying Rails in various weights. Get in touch with us, stating what weight rail and tonnage desired, and we will submit quotations.

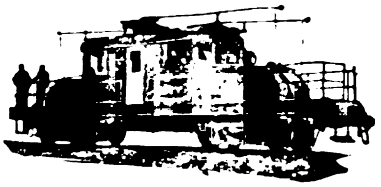
HYMAN-MICHAELS COMPANY
531 Peoples Gas Bldg., Chicago

OFFICES AND PLANTS AT
St. Louis, Mo. Detroit, Mich.
Pittsburgh, Pa.
San Francisco, Cal. New York
McKees Rocks, Pa.

FOR SALE

50-Ton Electric LOCOMOTIVE

600 Volt—D. C.

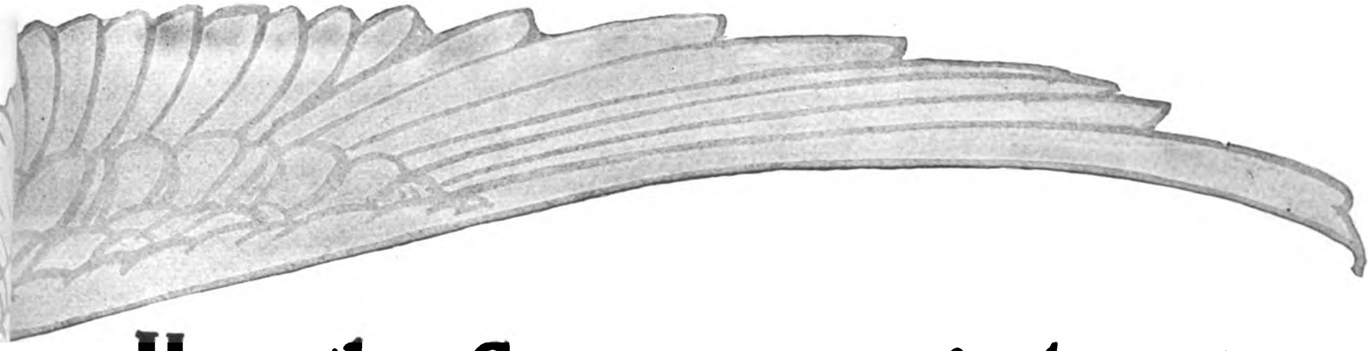


Locomotives are complete in every respect and are in excellent condition.

Full Specifications Upon Request

Hydro Salvage Syndicate
Niagara Falls—Ontario

WAR DEPARTMENT
U.S.
Rehber



How the Government is keeping a load off the Nation—warrants your investigation

The liquidation activities of the War Department in returning surplus war property to American business, constitute one of the greatest romances of our national industrial life.

We in this country are so accustomed to large-scale operation that in every phase of endeavor almost miraculous tasks receive a brief headline in the public press and then are speedily accepted as all in the day's work. We do not scratch beneath the surface.

War Department disposal of surplus property remaining after the war has received this flare of public acknowledgment, but a great many firms and individuals who directly and indirectly profit by the sale of surplus property are resting content with the knowledge that contrary to expectations general business has not been affected.

Following the armistice the prospective dumping of billions of dollars' worth of Government property on an already saturated market loomed as a spectre. Yet to date, in four short years, over two and a half billion dollars' worth of surplus property, held by the War Department, have been disposed of without causing the shock generally forecast.

It is on the basis of a big job well done that your Government asks nothing greater than that *you investigate* the remaining opportunities which the Government Sales of Surplus Properties offer you.

The range of material is so great, the prices so low, the conditions of sale so easy, that failure to investigate may mean a double loss to you—

As a taxpayer.

As a business man.

The Way to Investigate

Watch your Commercial Business Publication and the Metropolitan Dailies for announcements of specific auction or sealed bid sales.

Send for the Catalog mentioned in the announcement.

Check off the items that interest you.

Send a representative to the sale to inspect the materials—in advance, *if possible.*

To ensure you more leeway, send your name and address at once to Major J. L. Frink, Chief, Sales Promotion Section, Room 2515, Munitions Building, Washington, D. C. Advise him the character of materials you are interested in, and catalogs containing such materials will be forwarded you as rapidly as sales are scheduled.

Final commodity sales will begin in September and continue until liquidation of stocks is completed at the Quartermaster Depots in Brooklyn, Chicago, San Antonio and San Francisco. Offerings include a wide range of Quartermaster Supplies, Ordnance Property and smaller quantities of Engineer Property, Chemical Warfare and Medical and Hospital Supplies.

Important sales of Real Estate, Buildings, Plants and Warehouses will be held at Camp Devens, Ayer, Mass.; Camp Dix, N. J.; Ordnance Reserve Depot, Amatol, N. J.; Camp Meade, Md.; Ordnance Reserve Depot, Toledo, O.; Camp Knox, Louisville, Ky., and Camp Lewis, American Lake, Wash. Definite dates will be announced later.

Look for the Eagle before you shop.

WAR DEPARTMENT

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

- **Advertising, Street Car**
  - Collier, Inc., Barron G.
- **Air Receivers, Aftercoolers**
  - Ingersoll-Rand Co.
- **Anchors, Guy**
  - Electric Service Sup. Co.
  - Ohio Brass Co.
  - Standard Steel Works Co.
  - Westinghouse E. & M. Co.
- **Armature Shop Tools**
  - Electric Service Sup. Co.
- **Automatic Return Switch Stands**
  - Ramapo Ajax Corp.
- **Automatic Safety Switch Stands**
  - Ramapo Ajax Corp.
- **Axles**
  - Bemis Car Truck Co.
- **Axles, Car Wheel**
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
  - Carnegie Steel Co.
  - Westinghouse E. & M. Co.
- **Axle Straighteners**
  - Columbia M. W. & M. I. Co.
- **Babbitting Devices**
  - Columbia M. W. & M. I. Co.
- **Badges and Buttons**
  - Electric Service Sup. Co.
  - Internat'l Register Co., The
- **Barges, Steel**
  - American Bridge Co.
- **Bearings an Bearing Metals**
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - Gilbert & Sons. B. F. A.
  - Westinghouse E. & M. Co.
- **Bearings Center and Roller Side**
  - Stucki Co., A.
- **Bearings, Roller**
  - Stafford Roller Bearing Car Truck Corp.
- **Bells and Gongs**
  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
  - Consolidated Car-Heating Co.
  - Electric Service Sup. Co.
- **Boilers**
  - Babcock & Wilcox Co.
  - Edgemoor Iron Co.
- **Boiler Tubes**
  - Edgemoor Iron Co.
- **Bonding Apparatus**
  - American Steel & Wire Co.
  - Electric Railway Improvement Co.
  - Electric Service Sup. Co.
  - Ohio Brass Co.
  - Railway Track-work Co.
  - Rail Welding & Bonding Co.
- **Bonds, Rail**
  - American Steel & Wire Co.
  - Electric Railway Improvement Co.
  - Electric Service Sup. Co.
  - General Electric Co.
  - Ohio Brass Co.
  - Page Steel & Wire Co.
  - Railway Track-work Co.
  - Rail Welding & Bonding Co.
  - Westinghouse E. & M. Co.
- **Brackets and Cross Arms (See also Poles, Ties Posts, etc.)**
  - Bates Exp. Steel & Tr. Co.
  - Electric Ry. Equip. Co.
  - Electric Service Sup. Co.
  - Hubbard & Co.
  - Ohio Brass Co.
- **Brake Adjusters**
  - National Ry. Appliance Co.
  - Westinghouse Tr. Br. Co.
- **Brake Shoes**
  - Amer. Br. Shoe & Fdry. Co.
  - Barbour-Stockwell Co.
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
- **Brakes, Brake Systems and Brake Parts**
  - Ackley Brake & Supply Corp.
  - Allis-Chalmers Mfg. Co.
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - National Brake Co.
  - Westinghouse Tr. Br. Co.
- **Bridges, Steel**
  - American Bridge Co.
- **Brushes, Carbon**
  - General Electric Co.
  - Jeandron, W. J.
  - Le Carbone Co.
  - Morganite Brush Co.
  - U. S. Graphite Co.
  - Westinghouse E. & M. Co.
- **Brushes, Graphite**
  - Morganite Brush Co.
  - U. S. Graphite Co.
- **Brush Holders**
  - Anderson Mfg. Co., A. & J. M.
  - Columbia M. W. & M. I. Co.
- **Brushes, Wire Pneumatic**
  - Ingersoll-Rand Co.
- **Buildings, Steel**
  - American Bridge Co.
- **Buses, Motor**
  - Brill Co., The J. G.
- **Bushings**
  - National Vulcanized Fibre Co.
- **Bushings, Case Hardened and Manganese**
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
- **Cables (See Wires and Cables)**
- **Cambric, Tapes, Yellow and Black Varnished**
  - Irvington Varnish & Ins. Co.
- **Carbon Brushes (See Brushes Carbon)**
- **Car Lighting Fixtures**
  - Electric Service Sup. Co.
- **Car Panel Safety Switches**
  - Consolidated Car Heating Co.
  - Westinghouse E. & M. Co.
- **Cars, Dump**
  - Differential Steel Car Co.
  - St. Louis Car Co.
- **Cars, Passenger, Freight Express, etc.**
  - Amer. Car Co.
  - Brill Co., The J. G.
  - Kuhlman Car Co., G. C.
  - National Ry. Appliance Co.
  - Wason Mfg. Co.
- **Cars, Second Hand**
  - Electric Equipment Co.
- **Cars, Self-Propelled**
  - General Electric Co.
- **Castings, Brass, Composition or Copper**
  - Anderson Mfg. Co., A. & J. M.
  - Columbia M. W. & M. I. Co.
- **Castings, Gray Iron and Steel**
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
- **Castings, Malleable and Brass**
  - Amer. Brake Shoe & Fdry. Co.
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
- **Catchers and Retrievers, Trolley**
  - Electric Service Sup. Co.
  - Ohio Brass Co.
  - Trolley Supply Co.
  - Wood Co., Chas. N.
- **Catenary Construction**
  - Archbold-Brady Co.
- **Ceiling, Car**
  - Pantasote Co.
- **Change Carriers**
  - Cleveland Fare Box Co.
- **Circuit Breakers**
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Clamps and Connectors for Wires and Cables**
  - Anderson Mfg. Co., A. & J. M.
  - Electric Ry. Equip. Co.
  - Electric Service Sup. Co.
  - General Electric Co.
  - Hubbard & Co.
  - Ohio Brass Co.
  - Westinghouse E. & M. Co.
- **Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)**
  - Brill Co., The J. G.
  - Ohio Brass Co.
- **Clusters and Sockets**
  - General Electric Co.
- **Coal and Ash Handling (See Conveying and Hoisting Machinery)**
- **Coil Banding and Winding Machines**
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
- **Coils, Armature and Field**
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
- **Coils, Choke and Kicking**
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Coin-Counting Machines**
  - Cleveland Fare Box Co.
  - Electric Service Sup. Co.
  - Internat'l Register Co., The
- **Coin Sorting Machines**
  - Cleveland Fare Box Co.
- **Coin Wrapping Machines**
  - Cleveland Fare Box Co.
- **Commutator Slotters**
  - Electric Service Sup. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Commutator Truing Devices**
  - General Electric Co.
- **Commutators or Parts**
  - Cameron Elec'l Mfg. Co.
  - Columbia M. W. & M. I. Co.
  - Westinghouse E. & M. Co.
- **Compressors, Air**
  - Allis-Chalmers Mfg. Co.
  - General Electric Co.
  - Ingersoll-Rand Co.
  - Westinghouse Tr. Br. Co.
- **Compressors, Air, Portable**
  - Ingersoll-Rand Co.
- **Condensers**
  - Allis-Chalmers Mfg. Co.
  - General Electric Co.
  - Ingersoll-Rand Co.
  - Westinghouse E. & M. Co.
- **Condensor, Papers**
  - Irvington Varnish & Ins. Co.
- **Conduits, Flexible**
  - Alphaduct Co., The
- **Connectors, Solderless**
  - Westinghouse E. & M. Co.
- **Connectors, Trailer Car**
  - Consolidated Car-Heat'g Co.
  - Electric Service Sup. Co.
  - Ohio Brass Co.
- **Controllers or Parts**
  - Allis-Chalmers Mfg. Co.
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Controller Regulators**
  - Electric Service Sup. Co.
- **Controlling Systems**
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Converters, Rotary**
  - Allis-Chalmers Mfg. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Conveying and Hoisting Machinery**
  - Columbia M. W. & M. I. Co.
- **Copper Wire**
  - Anaconda Copper Min. Co.
  - Page Steel & Wire Co.
  - Rome Wire Co.
- **Cord Adjusters**
  - National Vulcanized Fibre Co.
- **Cord, Bell, Trolley, Register etc.**
  - Brill Co., The J. G.
  - Electric Service Sup. Co.
  - Internat'l Register Co., The
  - Roebling's Sons Co., J. A.
  - Samson Cordage Works
  - Trolley Supply Co.
- **Cord Connectors and Couplers**
  - Electric Service Sup. Co.
  - Samson Cordage Works
  - Wood. Co., Chas. N.
- **Couplers, Car**
  - Brill Co., The J. G.
  - Ohio Brass Co.
  - Westinghouse Tr. Br. Co.
- **Cranes**
  - Allis-Chalmers Mfg. Co.
- **Cross Arms (See Brackets)**
- **Crossings**
  - Ramapo Ajax Corp.
- **Crossing Foundations**
  - International Steel Tie Co.
- **Crossing Frog and Switch**
  - Ramapo Ajax Corp.
  - Wharton, Jr., & Co., Wm.
- **Crossing, Manganese**
  - Ramapo Ajax Corp.
- **Crossings Track (See Track, Special Work)**
- **Crossings, Trolley**
  - Ohio Brass Co.
- **Crushers, Rock**
  - Allis-Chalmers Mfg. Co.
- **Curtains and Curtain Fixtures**
  - Brill Co., The J. G.
  - Electric Service Sup. Co.
  - Morton Mfg. Co.
  - Pantasote Co.
- **Dealers Machinery**
  - Electric Equipment Co.
  - General Electric Co.
- **Derailing Devices (See Track Work)**
- **Derailing Switches**
  - Ramapo Ajax Corp.
- **Destination Signs**
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
- **Detective Service**
  - Wish Service, P. Edward
- **Door Operating Devices**
  - Con. Car-Heating Co.
  - Nat'l Pneumatic Co., Inc.
- **Doors and Door Fixtures**
  - Brill Co., The J. G.
  - General Electric Co.
  - Hale & Kilburn
- **Doors, Folding Vestibule**
  - Nat'l Pneumatic Co., Inc.
- **Draft Rigging (See Couplers)**
- **Drills, Rock**
  - Ingersoll-Rand Co.
- **Drills, Track**
  - American Steel & Wire Co.
  - Electric Service Sup. Co.
  - Ingersoll-Rand Co.
  - Ohio Brass Co.
- **Dryers, Sand**
  - Electric Service Sup. Co.
- **Ears**
  - Ohio Brass Co.
- **Electrical Wires and Cables**
  - Amer. Electrical Works
  - American Steel & Wire Co.
  - Roebling's Sons Co., J. A.
  - Rome Wire Co.
- **Electric Grinders**
  - Railway Track-Work Co.
- **Electric Transmission Towers**
  - American ridge Co.
- **Electrodes, Carbon**
  - Railway Track-Work Co.
- **Electrodes, Steel**
  - Railway Track-Work Co.
- **Enamels**
  - Beckwith-Chandler Co.
- **Engineers, Consulting, Contracting and Operating**
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  - Archbold-Brady Co.
  - Arnold Co., The
  - Beeler, John A.
  - Bibbins, J. Rowland
  - Byllesby & Co., H. M.
  - Day & Zimmerman
  - Ford, Bacon & Davis
  - Hemphill & Wells
  - Holst, Englehardt W.
  - Jackson, Walter
  - Kelly Cooke Co.
  - Ong, Joe R.
  - Parsons, Klapp, Brinkerhoff & Douglas
  - Richey, Albert S.
  - Robinson & Co., Inc., Dwight P.
  - Sanderson & Porter
  - Sangster, Andrew & Co.
  - Stevens & Wood, Inc.
  - Stone & Webster
  - White Engineering Corp., The J. G.
  - Wortham, Edwin
- **Engines, Gas, Oil or Steam**
  - Allis-Chalmers Mfg. Co.
  - Ingersoll-Rand Co.
  - Westinghouse E. & M. Co.
- **Fare Boxes**
  - Cleveland Fare Box Co.
  - National Ry. Appliance Co.
  - Ohmer Fare Register Co.
- **Fences, Woven Wire and Fence Posts**
  - American Steel & Wire Co.
- **Fenders and Wheel Guards**
  - Brill Co., The J. G.
  - Consolidated Car Fender Co.
  - Electric Service Sup. Co.
  - Trolley Supply Co.
- **Fibre and Fibre Tubing**
  - National Vulcanized Fibre Co.
  - Westinghouse E. & M. Co.
- **Field Coils (See Coils)**
- **Flangeway Guards, Steel**
  - Godwin Co., Inc., W. S.
- **Forgings**
  - Carnegie Steel Co.
  - Columbia M. W. & M. I. Co.
- **Frogs and Crossings, Tee Rail**
  - Ramapo Ajax Corp.
- **Frogs, Track**
  - (See Track Work)
  - Wharton, Jr., & Co., Wm.
- **Frogs, Trolley**
  - Ohio Brass Co.
- **Furnaces, Electric**
  - Pittsburgh Elec. Furnace Corp.
- **Fuses and Fuse Boxes**
  - Columbia M. W. & M. I. Co.
  - Consolidated Car-Heating Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Fuses, Refillable**
  - Columbia M. W. & M. I. Co
- **Gages, Oil and Water**
  - Ohio Brass Co.
- **Gaskets**
  - Westinghouse Tr. Br. Co.
- **Gas-Electric Cars**
  - General Electric Co.
- **Gas Producers**
  - Westinghouse E. & M. Co.
- **Gates, Car**
  - Brill Co., The J. G.
- **Gear Blanks**
  - Carnegie Steel Co.
- **Gear Cases**
  - Chillingworth Mfg. Co.
  - Columbia M. W. & M. I. Co
  - Electric Service Sup. Co.
  - Westinghouse E. & M. Co
- **Gears and Pinions**
  - Ackley Brake & Supply Corp.
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co
  - Electric Service Sup. Co.
  - General Electric Co.
  - National Railway Appliance Co.
  - Nuttall Co., R. D.
  - Tool Steel Gear & Pinion Co.
- **Generating Sets, Gas-Electric**
  - General Electric Co
- **Generators**
  - Allis-Chalmers Mfg. Co.
  - Westinghouse E. & M. Co.
- **Girder Rails**
  - Lorain Steel Co.
- **Goggles, Eye**
  - Smith Heater Co., Peter
- **Gongs (See Bells and Gongs)**
- **Greases (See Lubricants)**
- **Grinders and Grinding Supplies**
  - Railway Track-work Co.
- **Grinders, Portable**
  - Railway Track-work Co.
- **Grinders, Portable Electric**
  - Railway Track-work Co.
- **Grinding Bricks and Wheels**
  - Railway Track-work Co.
- **Guard Rail Clamps**
  - Ramapo Ajax Corp.
- **Guard Rails, Tee Rail and Manganese**
  - Ramapo Ajax Corp.
- **Guards, Trolley**
  - Electric Service Sup. Co.
  - Ohio Brass Co
- **Hammers, Pneumatic**
  - Ingersoll-Rand Co.
- **Harps, Trolley**
  - Anderson Mfg. Co., A. & J. M.
  - Electric Service Sup. Co.
  - Nuttall Co., R. D.
  - Star Brass Works
  - Thornton Trolley Wheel Co
- **Headlights**
  - Electric Service Sup. Co.
  - General Electric Co.
  - Ohio Brass Co.
  - Trolley Supply Co.
- **Headlining Enamel**
  - Anglo-American Varnish Co.
- **Heaters, Car (Electric)**
  - Consolidated Car-Heating Co
  - Gold Car Heating & Lighting Co.
  - National Ry. Appliance Co.
  - Smith Heater Co., Peter
- **Heaters, Car, Hot Air and Water**
  - Smith Heater Co., Peter
- **Heaters, Car (Stove)**
  - Electric Service Sup. Co.
  - Sterling Varnish Co.
  - Westinghouse E. & M. Co
- **Helmets, Welding**
  - Railway Track-work Co.
- **Herault Electric Furnaces**
  - American Bridge Co.
- **Hoists and Lifts**
  - Columbia M. W. & M. I. Co
  - Ford-Chain Block Co.
  - Ingersoll-Rand Co.
- **Hose, Bridges**
  - Ohio Brass Co.
- **Hydraulic Machinery**
  - Allis-Chalmers Mfg. Co.
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  - General Electric Co.
  - Westinghouse E. & M. Co.
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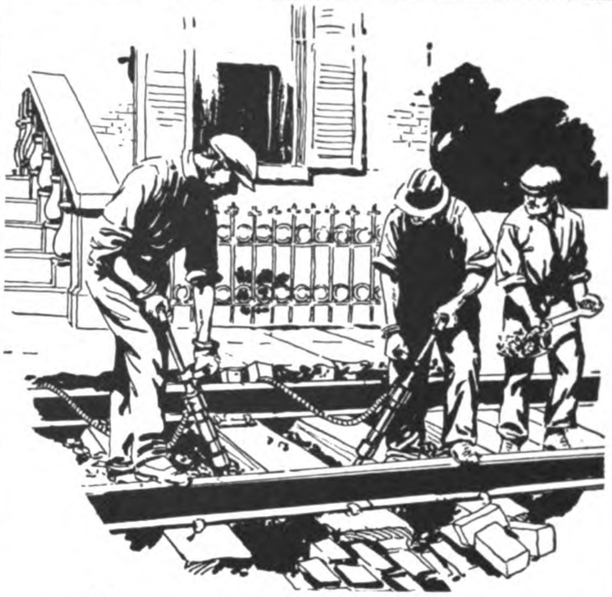

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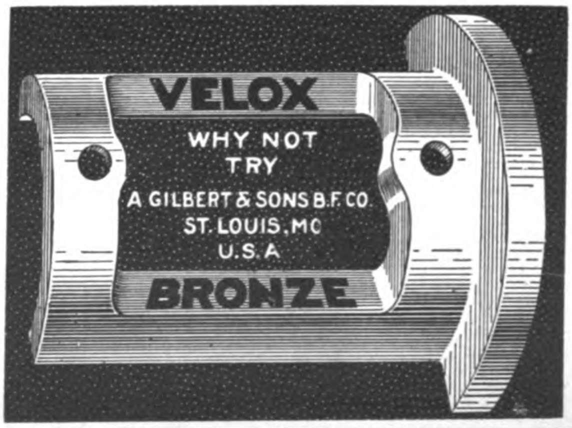

- **Insulating Varnishes**
  - Irvington Varnish & Ins. Co.
- **Insulation (See also Paints)**
  - Anderson Mfg. Co., A. & J. M.
  - Electric Ry. Equip. Co.
  - Electric Service Sup. Co.
  - General Electric Co.
  - Irvington Varnish & Ins. Co.
  - Okonite Co.
- **Insulation, Slot**
  - Irvington Varnish & Ins. Co.
- **Insulators (See also Line Material)**
  - Anderson Mfg. Co., A. & J. M.
  - Electric Ry. Equip. Co.
  - Electric Service Sup. Co.
  - Electrose Mfg. Co.
  - General Electric Co.
  - Irvington Varnish & Ins. Co.
  - Ohio Brass Co.
  - Westinghouse E. & M. Co.
- **Insulator Pins**
  - Electric Service Sup. Co.
  - Hubbard & Co.
- **Insulators, High Voltage**
  - Lapp Insulator Co.
- **Insurance, Fire**
  - Marsh & McLennan
- **Jacks (See also Cranes, Hoists and Lifts**
  - Buckeye Jack Mfg. Co.
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
- **Joints, Rail (See Rail Joints)**
- **Journal Boxes**
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
- **Junction Boxes**
  - Standard Underground Cable Co.
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  - Anderson Mfg. Co., A. & J. M.
  - Electric Service Sup. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Lamps, Arc and Incandescent (See also Headlights)**
  - Anderson Mfg. Co., A. & J. M.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Lamps, Signal and Marker**
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  - Ohio Brass Co.
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  - Nichols-Lintern Co.
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  - Anderson Mfg. Co., A. & J. M.
  - Electric Service Sup. Co.
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  - Shaw, Henry M.
  - Westinghouse E. & M. Co.
- **Line Material (See also Brackets, Insulators, Wires, etc.)**
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  - Archbold-Brady Co.
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
  - Electric Ry. Equip. Co.
  - Electrose Mfg. Co.
  - General Electric Co.
  - Ohio Brass Co.
  - Westinghouse E. & M. Co.
- **Locking Spring Boxes**
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  - Standard Oil Co. (Ind.)
  - Texas Company
  - Universal Lubricating Co.
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  - Standard Oil Co. (Ind.)
  - Texas Company
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  - Wharton, Jr., & Co., Wm.
- **Manganese Steel Guard Rails**
  - Ramapo Ajax Corp.
- **Manganese Steel Special Track Work**
  - Ramapo Ajax Corp.
  - Wharton, Jr., & Co., Wm.
- **Meters (See Instruments)**
- **Motor Buses (See Buses, Motor)**
- **Motormen's Seats**
  - Brill Co., The J. G.
  - Electric Service Sup. Co.
  - Heywood-Wakefield Co.
  - Wood Co., Chas. N.
- **Motors, Electric**
  - Allis-Chalmers Mfg. Co.
  - Westinghouse E. & M. Co.
- **Motors and Generators, Sets**
  - General Electric Co.
- **Nuts and Bolts**
  - Allis-Chalmers Mfg. Co.
  - Barbour-Stockwell Co.
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
  - Hubbard & Co.
- **Oils (See Lubricants)**
- **Oxygen**
  - International Oxygen Co.
- **Packing**
  - Electric Service Sup. Co.
  - Westinghouse E. & M. Co.
- **Paints and Varnishes (Preservative)**
  - Ackley Brake & Supply Corp.
  - Beckwith-Chandler Co.
- **Paints and Varnishes for Woodwork**
  - Beckwith-Chandler Co.
  - National Ry. Appliance Co.
- **Pavement Breakers**
  - Ingersoll-Rand Co.
- **Paving Brick, Vitrified**
  - National Paving Brick Mfrs. Ass'n.
- **Paving Guards, Steel**
  - Godwin Co., Inc., W. S.
- **Paving Material**
  - Amer. Br. Shoe & Fdry. Co.
- **Pickups, Trolley Wire**
  - Electric Service Sup. Co.
  - Ohio Brass Co.
- **Pinion Pullers**
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - Wood Co., Chas. N.
- **Pinions (See Gears)**
- **Pins, Case Hardened, Wood and Iron**
  - Bemis Car Truck Co.
  - Electric Service Sup. Co.
  - Ohio Brass Co.
  - Westinghouse Tr. Br. Co.
- **Pipe Fittings**
  - Westinghouse Tr. Br. Co.
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  - Ramapo Ajax Corp.
- **Pliers—Rubber Insulated**
  - Electric Service Sup. Co.
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  - Hubbard & Co.
- **Pole Line Hardware**
  - Ohio Brass Co.
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  - Electric Ry. Equip. Co.
  - Hubbard & Co.
- **Poles, Trolley**
  - Anderson Mfg. Co., A.& J. M.
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
  - Nuttall Co., R. D.
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  - Ingersoll-Rand Co.
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  - International Reg. Co., The
  - Wood Co., Chas. N.
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  - Ramapo Ajax Corp.
- **Rail Grinders (See Grinders)**
- **Rail Joints**
  - Carnegie Steel Co.
  - Rail Joint Co.
- **Rails, Steel**
  - Carnegie Steel Co.
- **Railway Paving Guards, Steel**
  - Godwin Co., Inc., W. S.
- **Railway Safety Switches**
  - Consolidated Car-Heating Co.
  - Westinghouse E. & M. Co.
- **Rail Welding**
  - Metal & Thermit Corp.
  - Railway Track-Work Co.
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  - Brill Co., The J. G.
  - Electric Service Sup. Co.
  - Hale & Kilburn
  - Heywood-Wakefield Co.
- **Registers and Fittings**
  - Brill Co., The J. G.
  - Electric Service Sup. Co.
  - International Reg. Co., The
  - Ohmer Fare Register Co.
  - Rooke Automatic Reg. Co.
- **Reinforcement, Concrete**
  - American Steel & Wire Co.
  - Carnegie Steel Co.
- **Repair Shop Appliances (See also Coil Banding and Winding Machines)**
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
- **Repair Work (See also Coils)**
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Replacers, Car**
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
- **Resistance, Grid**
  - Columbia M. W. & M. I. Co.
- **Resistance, Wire and Tube**
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Resistances**
  - Consolidated Car-Heating Co.
- **Retrievers, Trolley (See Catchers and Retrievers, Trolley)**
- **Rheostats**
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Roller Bearings**
  - Stafford Roller Bearing Car Truck Corp.
- **Sanders, Track**
  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
  - Nichols-Lintern Co.
  - Ohio Brass Co.
- **Sash Fixtures, Car**
  - Brill Co., The J. G.
- **Sash, Metal Car Window**
  - Hale & Kilburn
- **Scrapers, Track (See Cleaners and Scrapers, Track)**
- **Screw Drivers, Rubber Insulated**
  - Electric Service Sup. Co.
- **Seating Materials**
  - Brill Co., The J. G.
- **Seats, Bus**
  - Hale & Kilburn
  - Heywood-Wakefield Co.
  - St. Louis Car Co.
- **Seats, Car (See also Rattan)**
  - Brill Co., The J. G.
  - Hale & Kilburn
  - Heywood-Wakefield Co.
  - St. Louis Car Co.
- **Second Hand Equipment**
  - Electric Equipment Co.
- **Shades, Vestibule**
  - Brill Co., The J. G.
- **Shovels**
  - Allis-Chalmers Mfg. Co.
  - Brill Co., The J. G.
  - Hubbard & Co.
- **Side Bearings (See Bearings, Center and Side)**
- **Signals, Car Starting**
  - Con. Car Heating Co.
  - Electric Service Sup. Co.
  - Nat'l Pneumatic Co., Inc.
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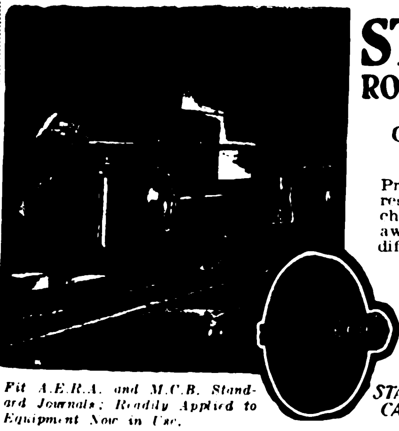

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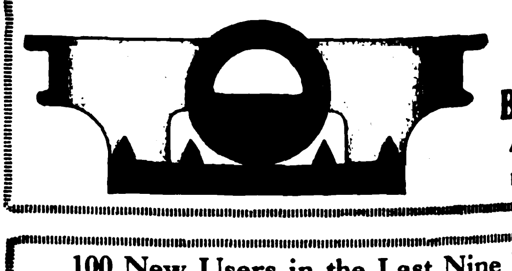

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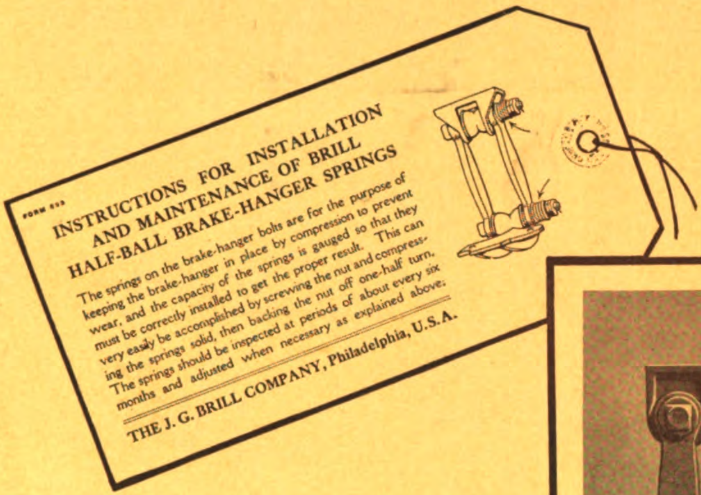

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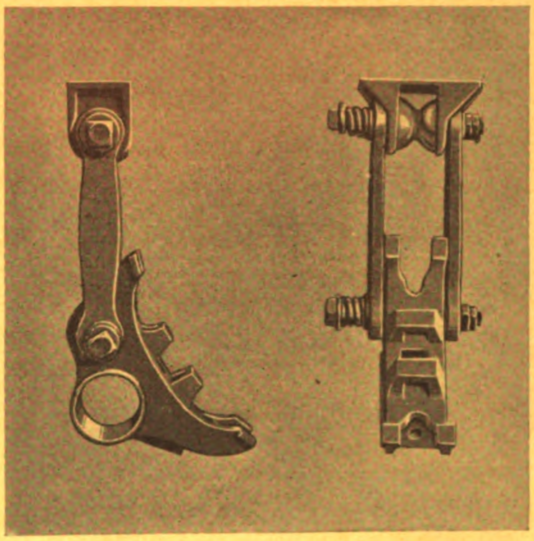

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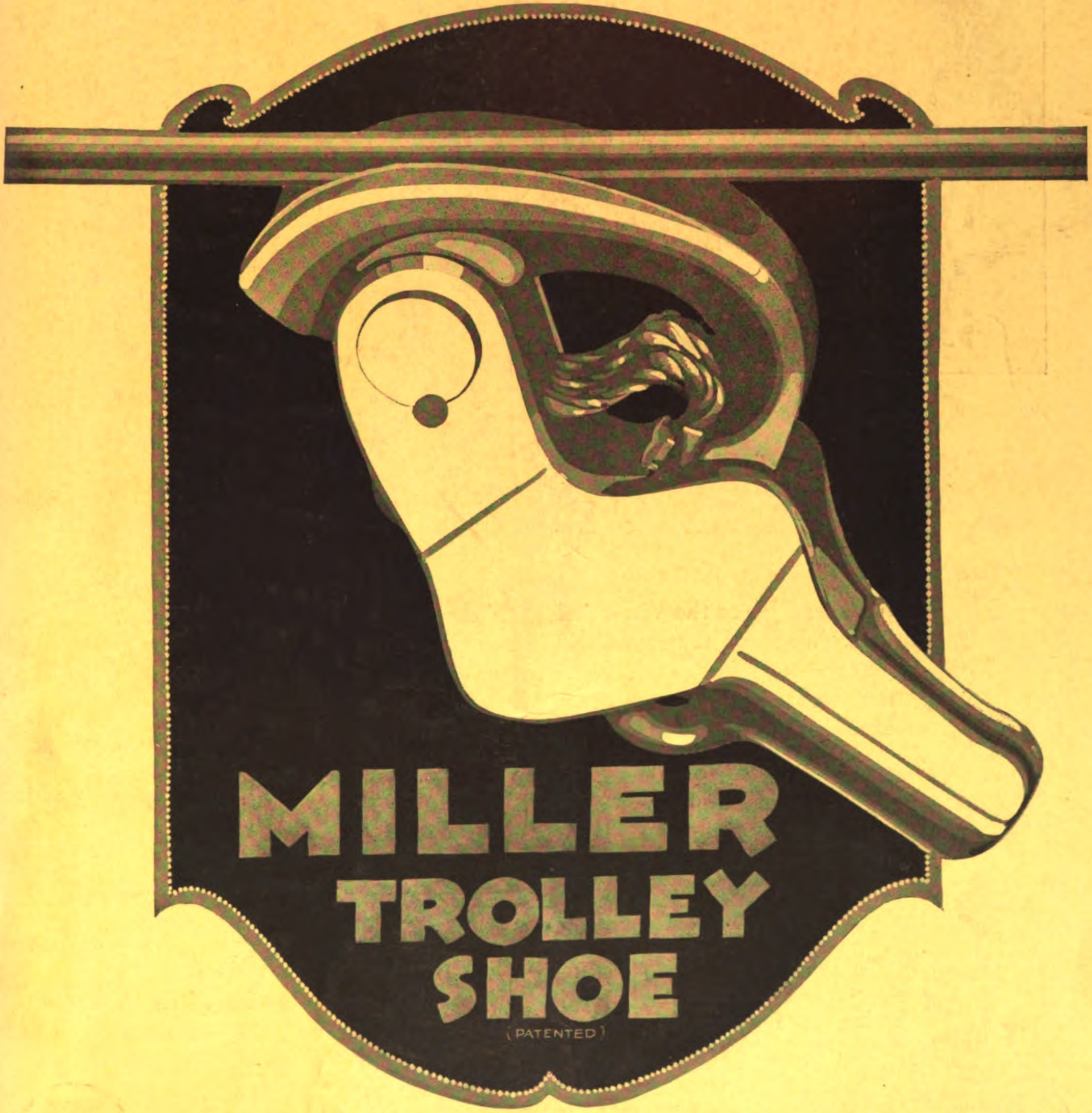

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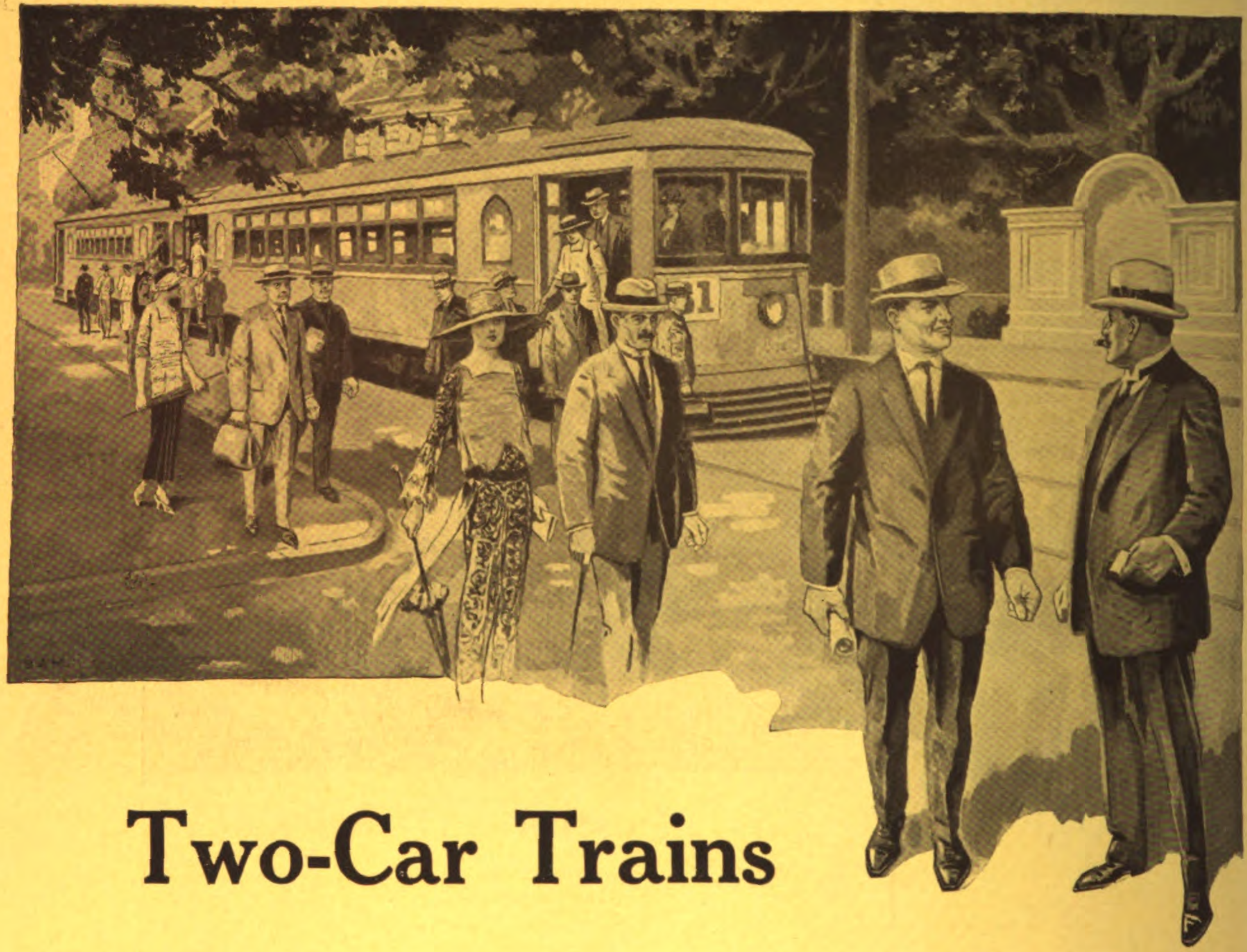

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Illustration Department

A VISIT to the Illustration Department—one of the most interesting sections of the plant—is a revelation to all who have wondered how great blueprints and the miscellany of things pictured in the paper are brought down to comparatively small cuts and yet show all the details. This is a science in itself. And because this work requires the constant application of scientific principles the department has earned the name of "Illustration Laboratory." Here poor photographs that come in are turned into clear illustrations; rough pencil sketches hastily outlined by the editors or contributors become beautiful line drawings; mere suggestions later take form in perfect illustrations, and all have a uniform style of lettering—always legible in the final reduced reproduction. Practically every picture seen in our publications has been made over in some way—reduced, enlarged, improved, relettered, redrawn—by the twenty-five men in this department.

The photographs and photostats made here are handled by skilled operators, specially trained in color photography. Mechanical engineers and mechanical draughtsmen, graduates of technical schools, handle the line work, tracing, finishing, lettering and layout work. The real training of these men, however, has been received in the House of McGraw-Hill, for no school teaches the work of transforming illustrations for technical publications. The men who head this work and are responsible for the superior quality of some 800 different pieces a month, are mechanical engineers as well as illustration specialists.

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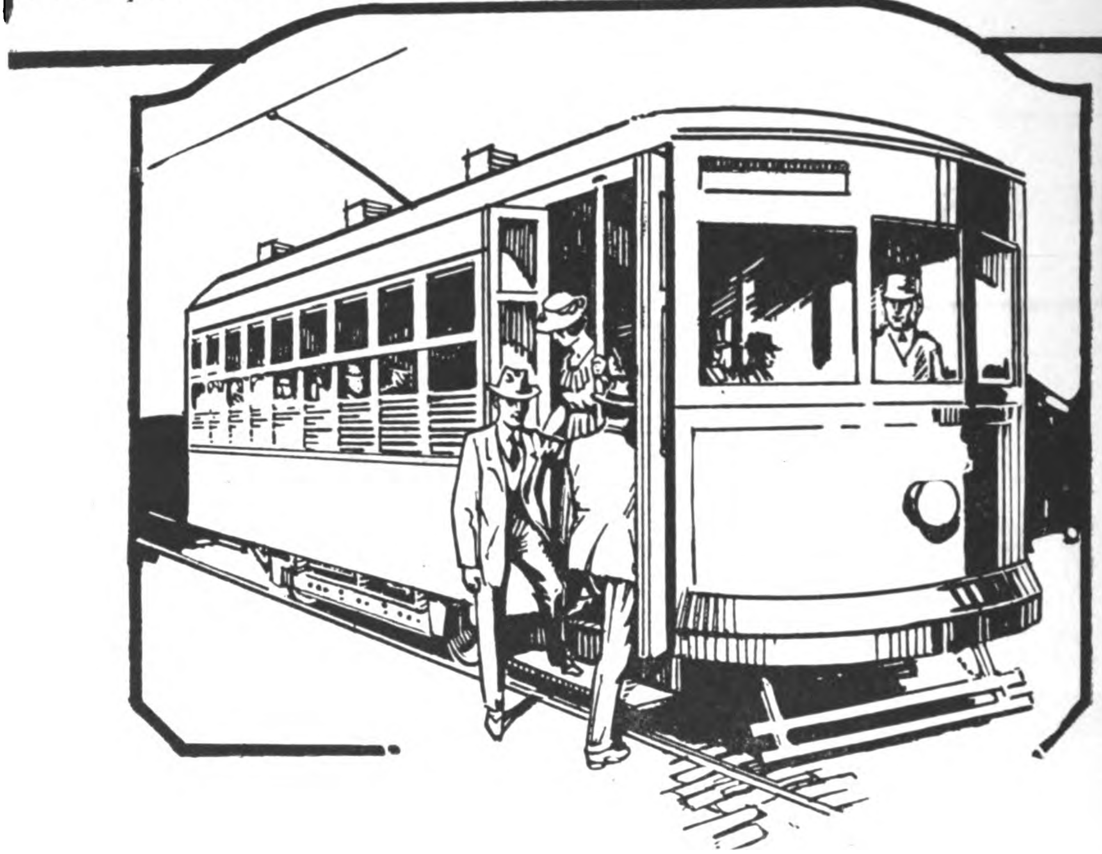
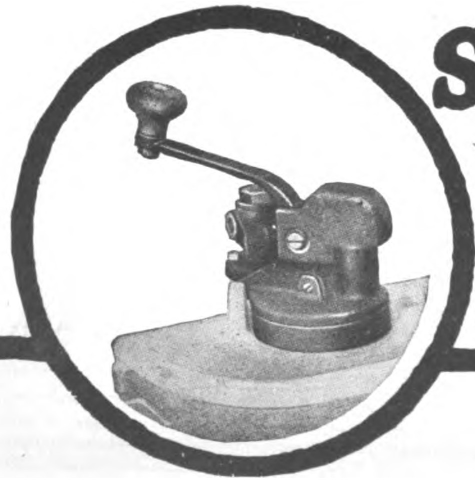


Philadelphia Knows—

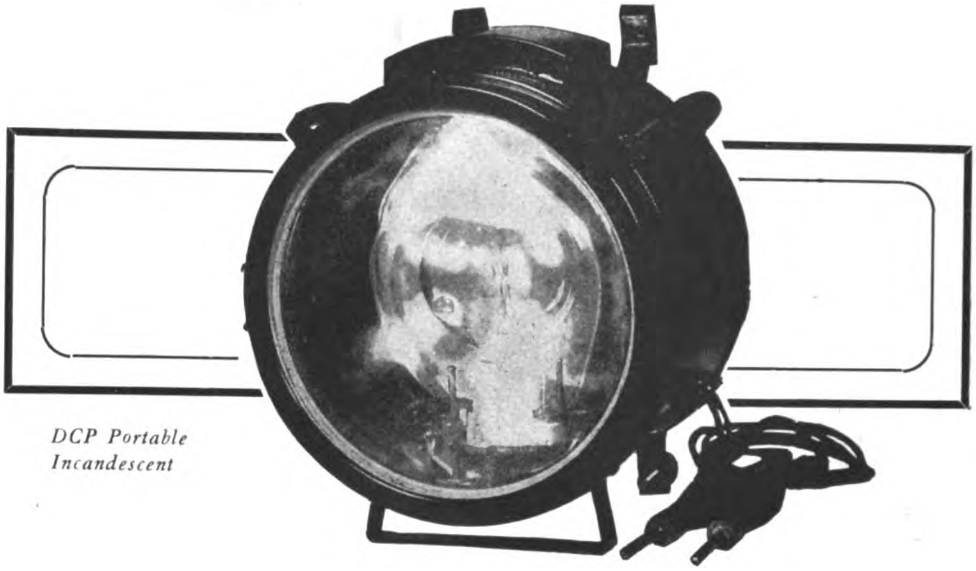
It was not "hasty action" or "snap judgment" that caused the Philadelphia Rapid Transit Co. to place its recent record-breaking order for 520 new Safety Cars.

Philadelphia already has 181 cars in service which were converted for Safety Car operation by the use of our equipment. The huge order for new cars came as the result of what the old cars had done.

Nothing truer has been said than that "One Safety Car Sells Another."



SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.
Postal and Telegraphic Address:
WILMERDING, PA.
CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH



DCP Portable Incandescent

Where Voltage is Constant—

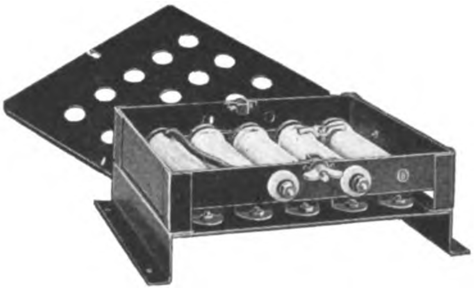
This is the Headlight for High-Speed Roads

For high-speed interurban roads, a DCP Imperial Headlight with a 500-watt lamp will give the maximum possible illumination from an incandescent headlight.

It throws a concentrated beam of light for the most effective track illumination.

The DCP can be used with 500-watt or smaller lamps. The lamp receptacle has universal adjustment—up, down or sidewise—to the exact focal point of the reflector.

If your trolley voltage is constant — as it should be for proper incandescent headlight illumination—a Crouse-Hinds Type DCP Imperial Headlight is your headlight. Complete specifications on the type DCP and other Imperial Headlights — luminous arc, carbon arc or incandescent — are given in special headlight catalog No. 210. Copy on request.



The improved Form C Resistance Box exactly fits the requirements of this headlight. It is small, durable and has an adjustable contact for accurate setting of current to voltage conditions.

Crouse-Hinds Imperial Headlights are sold exclusively by

The Ohio Brass Co.
Mansfield, Ohio, U.S.A.

New York Philadelphia Pittsburgh Charleston, W. Va. Chicago Los Angeles San Francisco Paris, France

Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators

Insurance plus
Marsh & McLennan Service

A Worth While Saving

The Service of Marsh & McLennan Engineers results in a direct dollars and cents saving in insurance cost.

A large Eastern corporation, for example, was able to reduce its insurance cost from $17.50 per thousand to $4.30 per thousand, by carrying out the recommendations of our engineering service.

We will be glad to outline this service to business executives who are interested in reducing insurance cost.

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Westinghouse "Bungalow" DH type air compressor.

DH-16 COMPRESSOR

for

Light and Medium-weight Cars

THE excellent performance of the DH-16 Compressor has made it a general favorite for light and medium-weight cars in all classes of service.

Thousands of these light, compact, low-built "Bungalow" machines are now in use and the steady demand they have created attests to the dependable service they give—and the economy they represent.

Our representatives will be glad to give their time to a solution of your compressor problems. The DH-16 type may be just what you need.

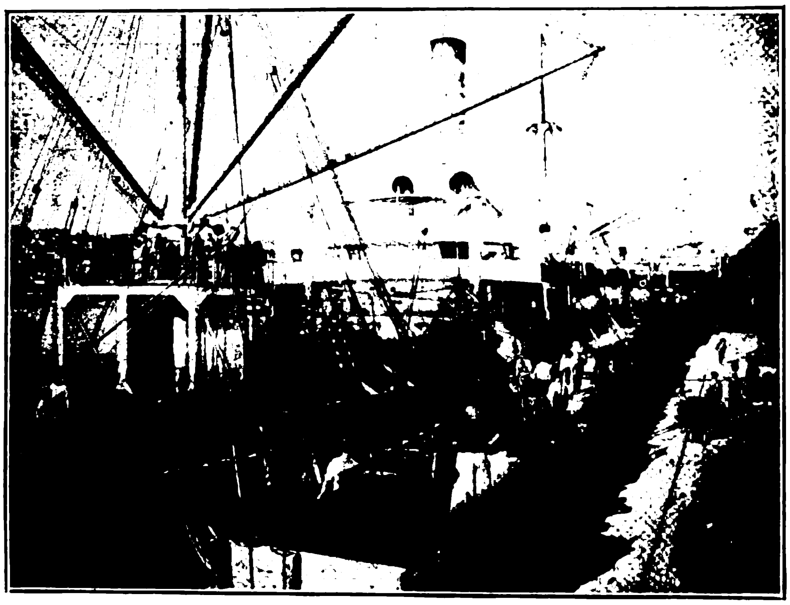
OTHER "BUNGALOWS"

DH type compressors are built in two other sizes, the DH-10 and the DH-25, the former having a piston displacement of 10 cu. ft. per minute, and the latter 25.

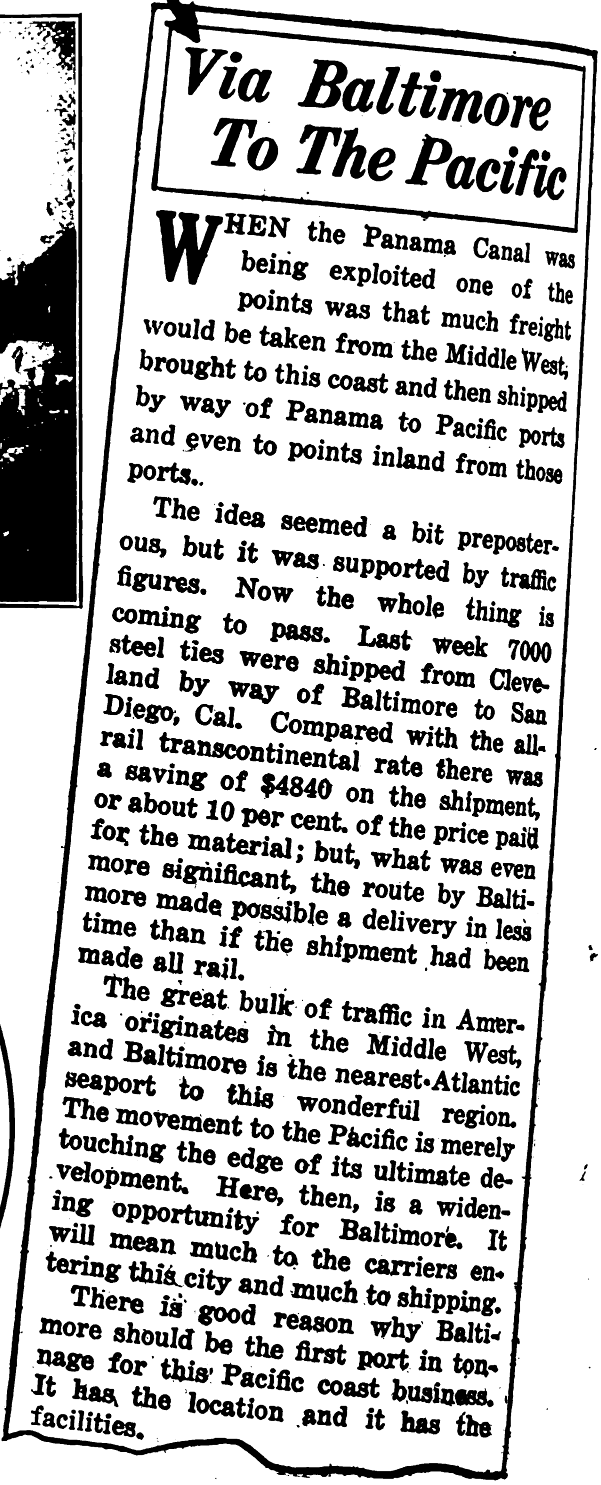
Westinghouse Traction Brake Company
General Office and Works: Wilmerding, Pa.

WESTINGHOUSE TRACTION BRAKES

STEEL TWIN TIES GO



Unloading Twin Ties at San Diego, July 5th



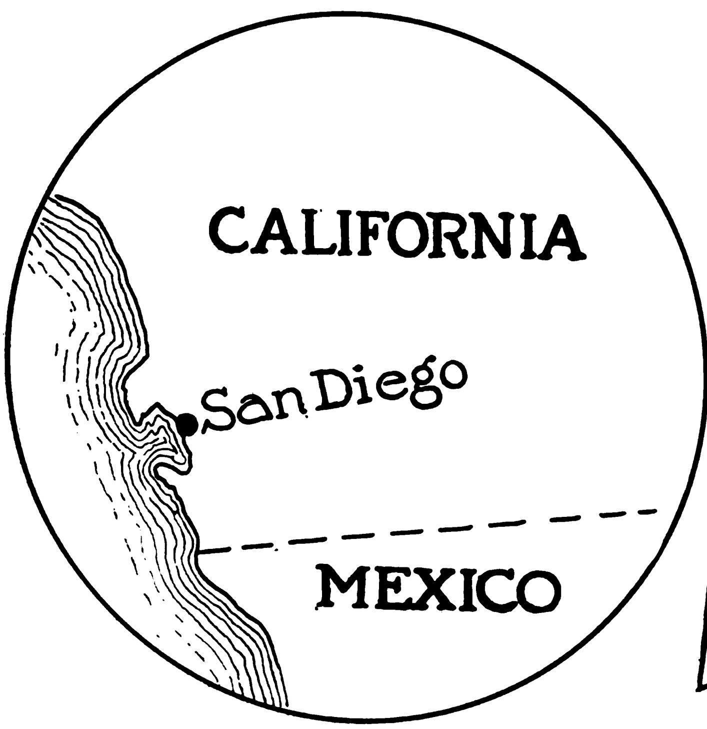
Via Baltimore To The Pacific

WHEN the Panama Canal was being exploited one of the points was that much freight would be taken from the Middle West, brought to this coast and then shipped by way of Panama to Pacific ports and even to points inland from those ports.

The idea seemed a bit preposterous, but it was supported by traffic figures. Now the whole thing is coming to pass. Last week 7000 steel ties were shipped from Cleveland by way of Baltimore to San Diego, Cal. Compared with the all-rail transcontinental rate there was a saving of $4840 on the shipment, or about 10 per cent. of the price paid for the material; but, what was even more significant, the route by Baltimore made possible a delivery in less time than if the shipment had been made all rail.

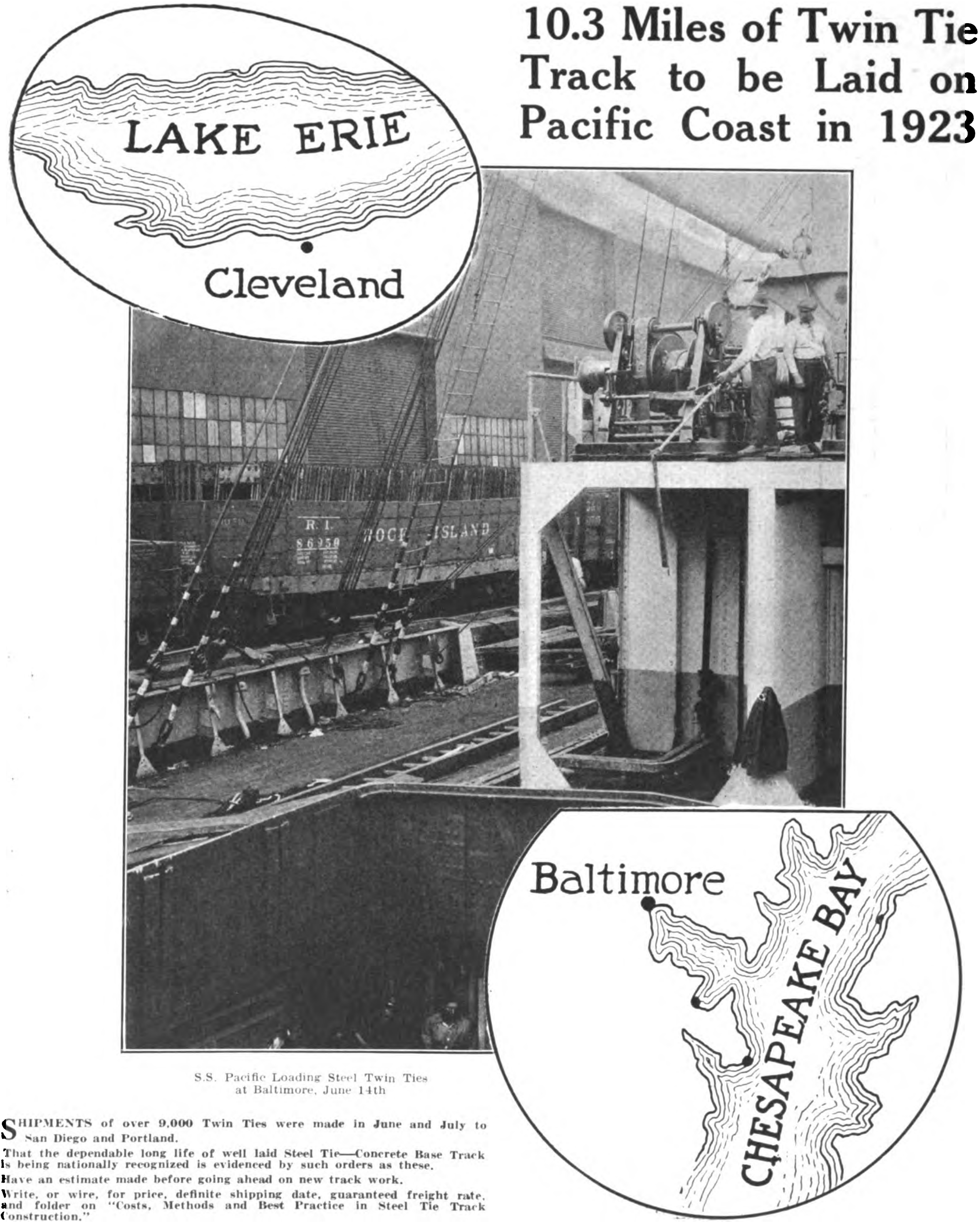
The great bulk of traffic in America originates in the Middle West, and Baltimore is the nearest Atlantic seaport to this wonderful region. The movement to the Pacific is merely touching the edge of its ultimate development. Here, then, is a widening opportunity for Baltimore. It will mean much to the carriers entering this city and much to shipping.

There is good reason why Baltimore should be the first port in tonnage for this Pacific coast business. It has the location and it has the facilities.



Steel Twin Tie Track

10.3 Miles of Twin Tie Track to be Laid on Pacific Coast in 1923



S.S. Pacific Loading Steel Twin Ties at Baltimore, June 14th

SHIPMENTS of over 9,000 Twin Ties were made in June and July to San Diego and Portland.

That the dependable long life of well laid Steel Tie—Concrete Base Track is being nationally recognized is evidenced by such orders as these.

Have an estimate made before going ahead on new track work.

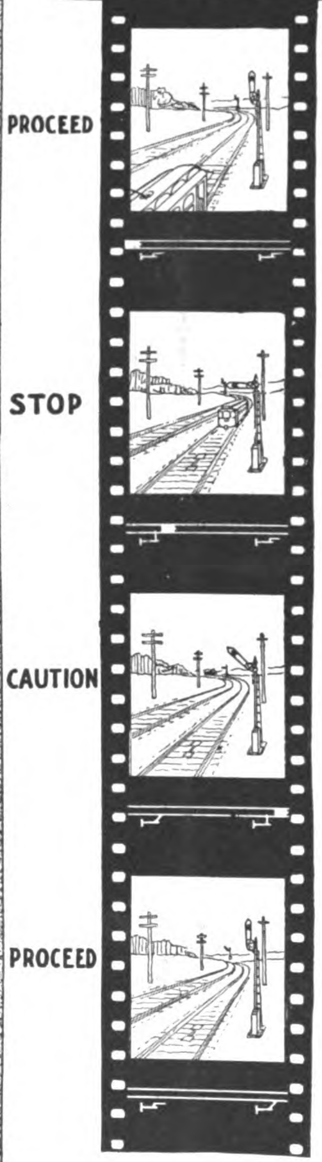
Write, or wire, for price, definite shipping date, guaranteed freight rate, and folder on "Costs, Methods and Best Practice in Steel Tie Track Construction."

THE INTERNATIONAL STEEL TIE COMPANY, Cleveland, Ohio

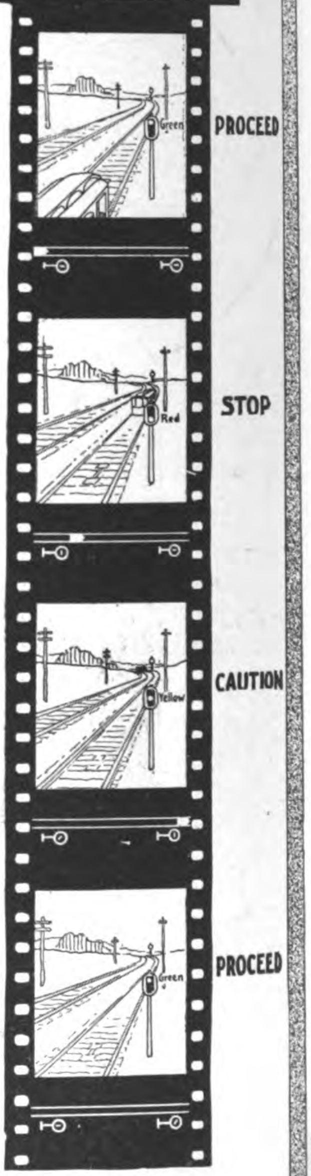
Canadian Representatives—Sarnia Bridge Company, Limited, Sarnia, Ontario

Steel Twin Tie Track

SEMAPHORE


PROCEED
STOP
CAUTION
PROCEED

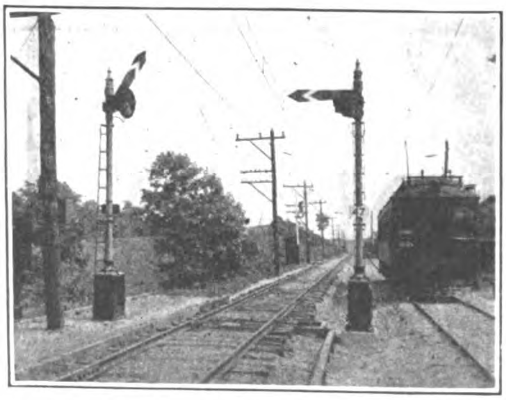
LIGHT


PROCEED
Green
STOP
Red
CAUTION
Yellow
PROCEED
Green

FOR DOUBLE TRACK
Interurban Railways

Union automatic ▣ block signals ▣

afford a simple system of indications easily understood by trainmen. The continuous A. C. track circuit makes possible the use of "polarized" or "wireless" control and insures the display of the proper indication at all times.



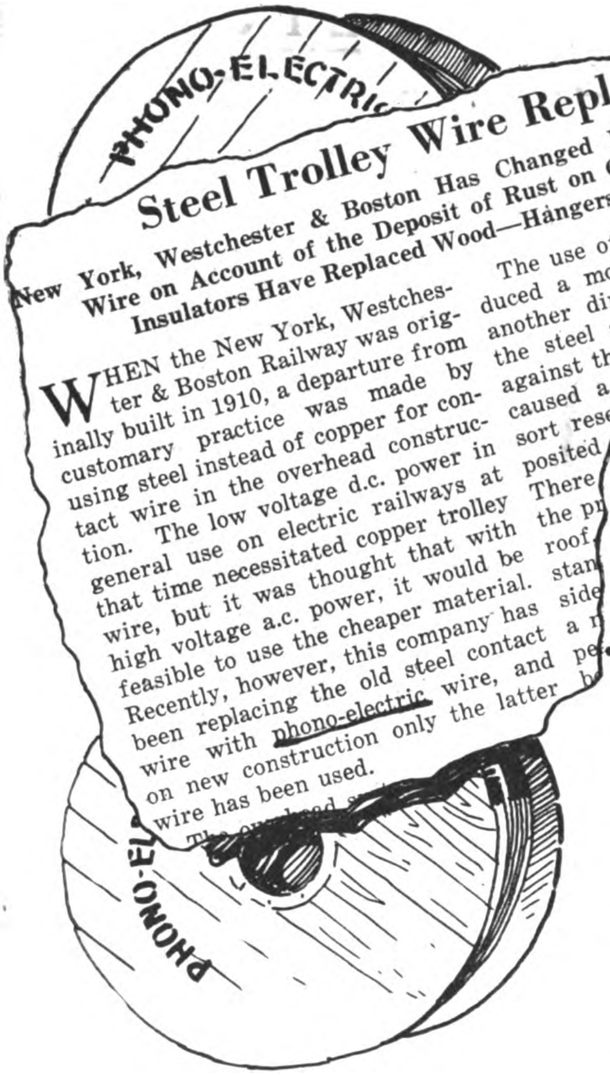
On the W. B. & A. Railroad

UNION EQUIPMENT WILL SOLVE YOUR INTERURBAN TRAFFIC PROBLEMS

Let us study your operating conditions and cooperate with you in considering what *automatic block signaling* will do for *your line.*

Union Switch & Signal Co.

SWISSVALE, PA.

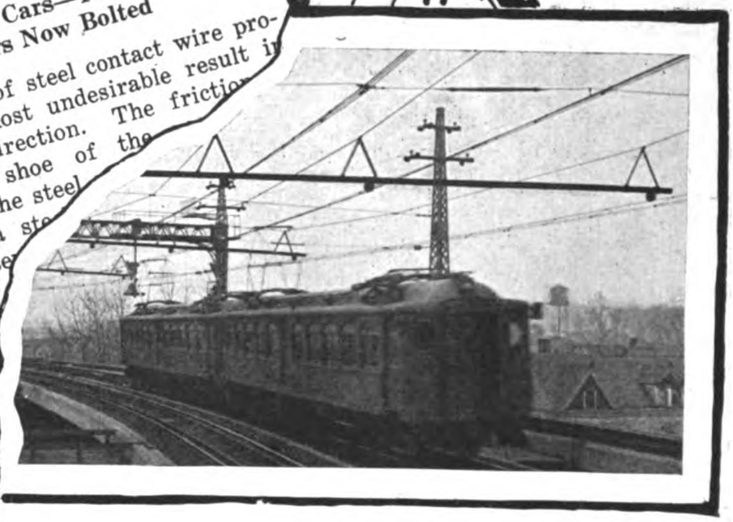


Steel Trolley Wire Replaced

New York, Westchester & Boston Has Changed Material of Contact Wire on Account of the Deposit of Rust on Cars—Porcelain Insulators Have Replaced Wood—Hangers Now Bolted

WHEN the New York, Westchester & Boston Railway was originally built in 1910, a departure from customary practice was made by using steel instead of copper for contact wire in the overhead construction. The low voltage d.c. power in general use on electric railways at that time necessitated copper trolley wire, but it was thought that with high voltage a.c. power, it would be feasible to use the cheaper material. Recently, however, this company has been replacing the old steel contact wire with phono-electric wire, and on new construction only the latter wire has been used.

The use of steel contact wire produced a most undesirable result i another direction. The frictio the steel shoe of th against the steel caused a st sort rese posited There the pr roof. stan side a r pe b



Found it cheaper to use Phono-Electric and save the paint on cars—

With the steel wire in use on the New York, Westchester & Boston Railway, freshly-painted cars after the first rain storm, appeared like old, weather worn rolling stock. The yellowish red iron oxide, deposited on the roof by the wearing of the steel wire, washed down over the sides of the cars, and gave them a streaked and dingy look. It kept the painters busy, but it was hard on the railway's maintenance account.

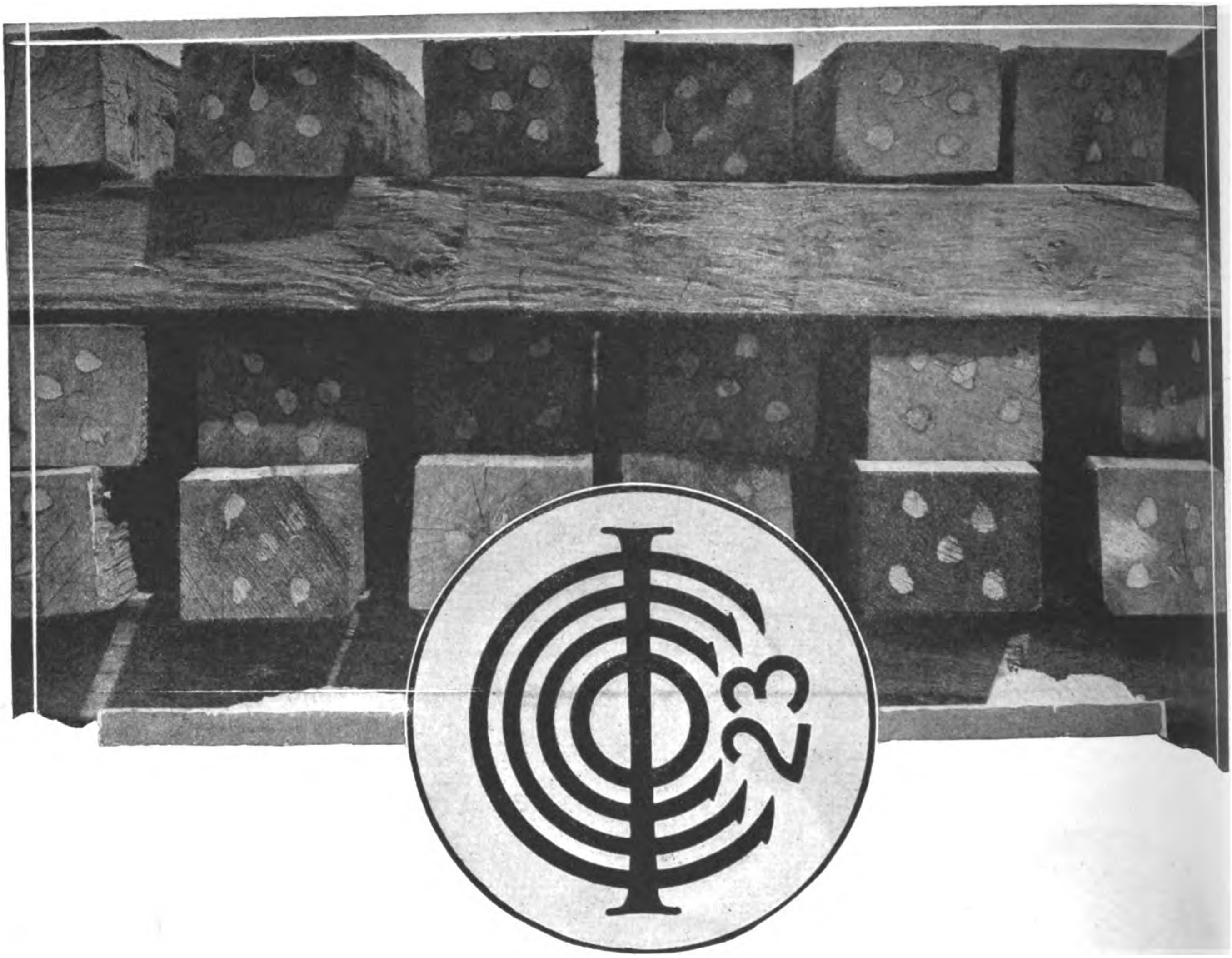
So now this Company has standardized on Phono-Electric. They escape the disastrous effects of steel wire rust, get far longer pantograph life, and have a trolley wire which lasts them several times as long as copper would. More than two-thirds of their line is now equipped with Phono-Electric.

Use Phono-Electric for maximum maintenance economy.

Bridgeport Brass Company
Bridgeport Connecticut

"Bri◆ort"

Phono-Electric



This TRADE MARK *of Quality Represents Only Standard* A. R. E. A. *Specification Ties*

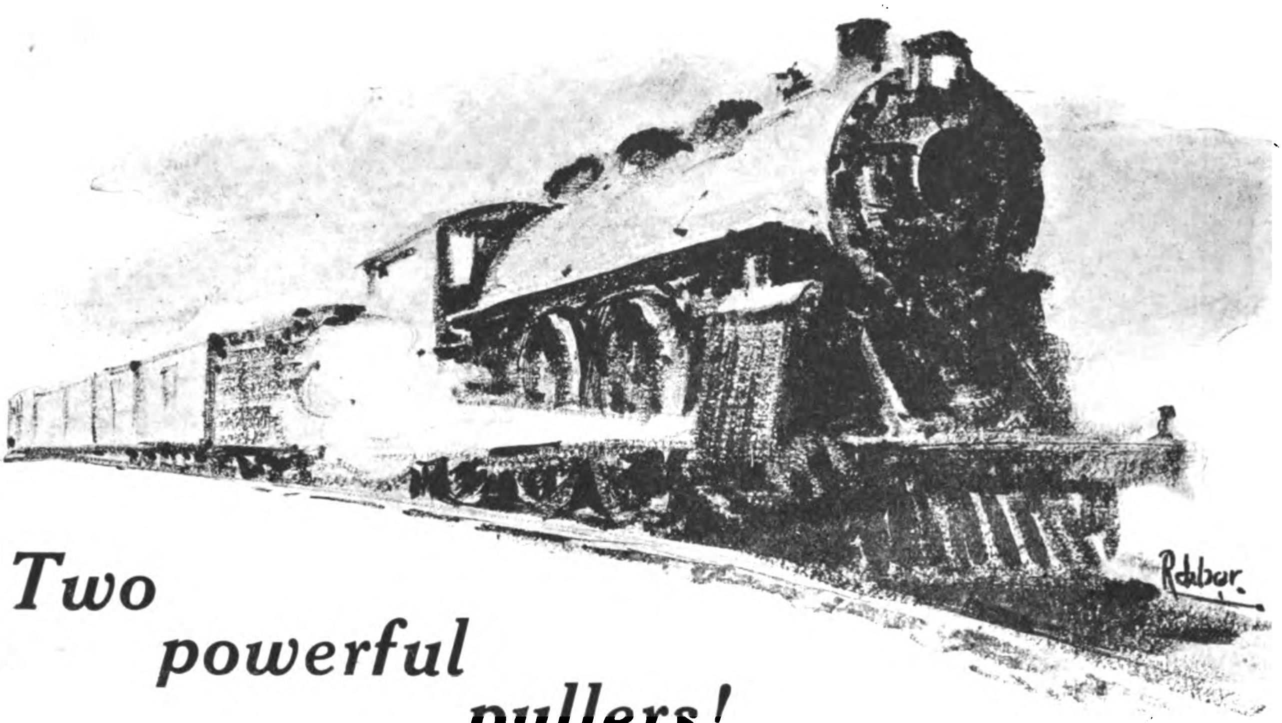
Examine the illustration above. It illustrates the way every International Tie is marked to indicate the grade when accepted in the woods. Five dots represent a No. 5 tie, four dots a No. 4 and likewise with grades No. 3, No. 2 and No. 1. This method of marking plainly each tie on both ends guarantees to the railroad that there is no grading up between the time the tie is accepted from the producer and its delivery to the road and assures exactly the kind of a tie it specifies, without subterfuge, over grading or deviation in any form.

Furthermore, International Ties are permanently identified by the I. C. C. Co. Dating Nails showing the year in which they leave our plants. We have hundreds of thousands of these high grade ties at our plants, carefully sorted and piled ready for your check inspection.

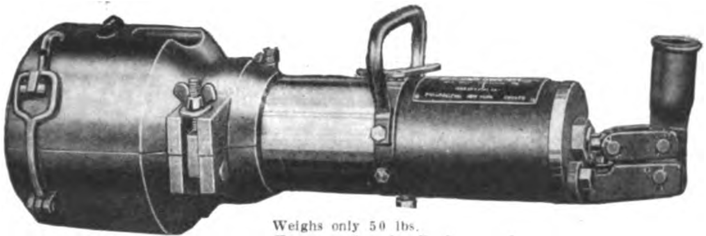
Just specify the timber, the grade and treatment desired.

International Creosoting & Construction Co.
General Office—Galveston, Texas
Plants: Texarkana, Texas Beaumont, Texas Galveston, Texas

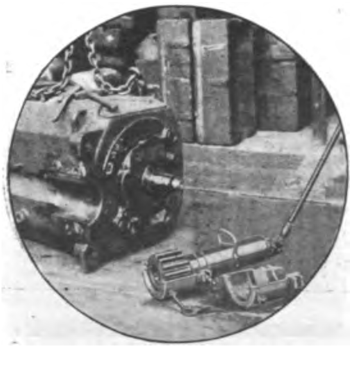
INTERNATIONAL TREATED TIES



Two powerful pullers!



Weighs only 50 lbs.
Has convenient handle for carrying.



Peerless Pinion Pullers

will start even the toughest ones . . .

Just as the railroad requires most powerful locomotives to apply that enormous pull necessary to get the heavy freight cars moving, so also the mechanic needs a source of resistless force to start the sticky pinion from its frozen fit on the shaft.

The Peerless Pinion Puller has been developed to meet this need. Do not waste your time and risk your equipment by hammering. It's dangerous as well as slow.

Use the one-man, portable, hydraulic Peerless. It does the job the efficient way.

Let us give you further details

ELECTRIC SERVICE SUPPLIES CO.
Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA	NEW YORK	CHICAGO
17th and Cambria Streets	50 Church Street	Monadnock Bldg.

Branch Offices: Boston, Scranton, Pittsburgh
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You know what You're getting!

-when you specify "P & H" Guaranteed Penetration Process poles. You eliminate all uncertainty, all guesswork. You get the utmost in pole reliability, low maintenance costs, long pole life.

"P&H" *Guaranteed Penetration Process*

—guarantees a full **one-half inch** uniform penetration of preservative throughout the ground line area of every pole. You get a written guarantee with every shipment which agrees to refund the butt-treating price on any pole that does not show the full specified penetration.

There is only one "Guaranteed Penetration Process"—the "P & H." Why take chances? Insist on the original—the genuine "P & H."

We can fill any pole needs—for Butt-Treated and untreated Northern White and Western Red Cedar poles —or any form of Butt-Treatment.

Prompt shipment assured by the convenient location of our yards in the North Central and Western States.

Get the facts—write for interesting folder on the Butt-Treatment of cedar poles.

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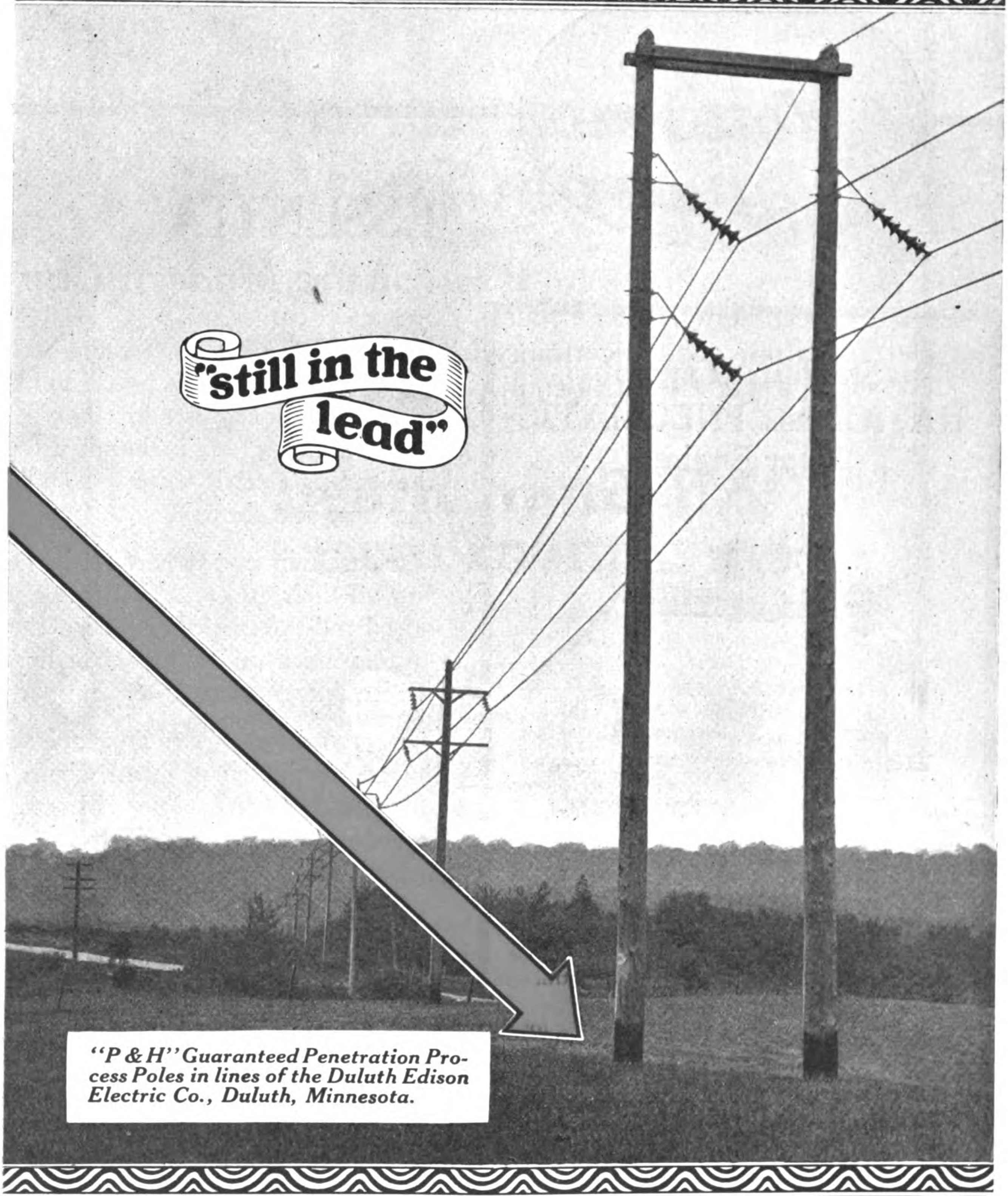

"P & H" Guaranteed Penetration Process Poles in lines of the Duluth Edison Electric Co., Duluth, Minnesota.

HILL CO.

Grand Rapids, Mich., Powers Bldg.

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Chicago, Ill., 19 So. LaSalle St.

Kansas City, Mo. 717 Bryant Bldg.
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Dallas, Texas, 311 Sumpter Bldg.

Buffalo, N. Y. 950 Ellicott Sq. Bldg.
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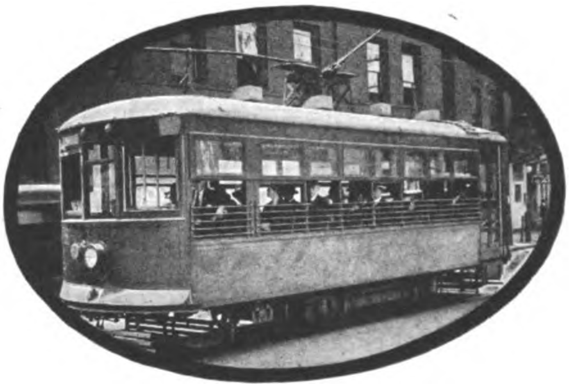
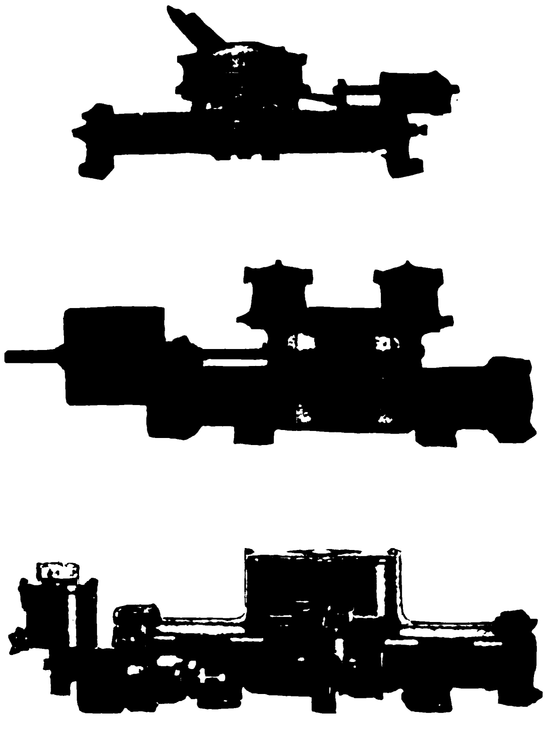


ESSENTIAL
for the Modern Car

Standard Type of NATIONAL PNEUMATIC Door Engines



National Pneumatic Door and Step Operating Mechanisms, Motorman's Signal Lights and other devices are being used by hundreds of the leading electric railway companies here and abroad.

Car designers everywhere are bending all their efforts to improve the speed and safety of the modern car. In this endeavor, National Pneumatic Equipment plays a leading part.

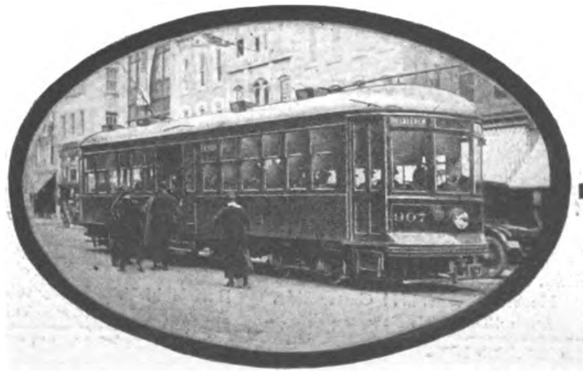
Let us study your particular operating and equipment problem, whether for cars or buses. We will make recommendations, and refer you to other roads where problems like yours have been solved.

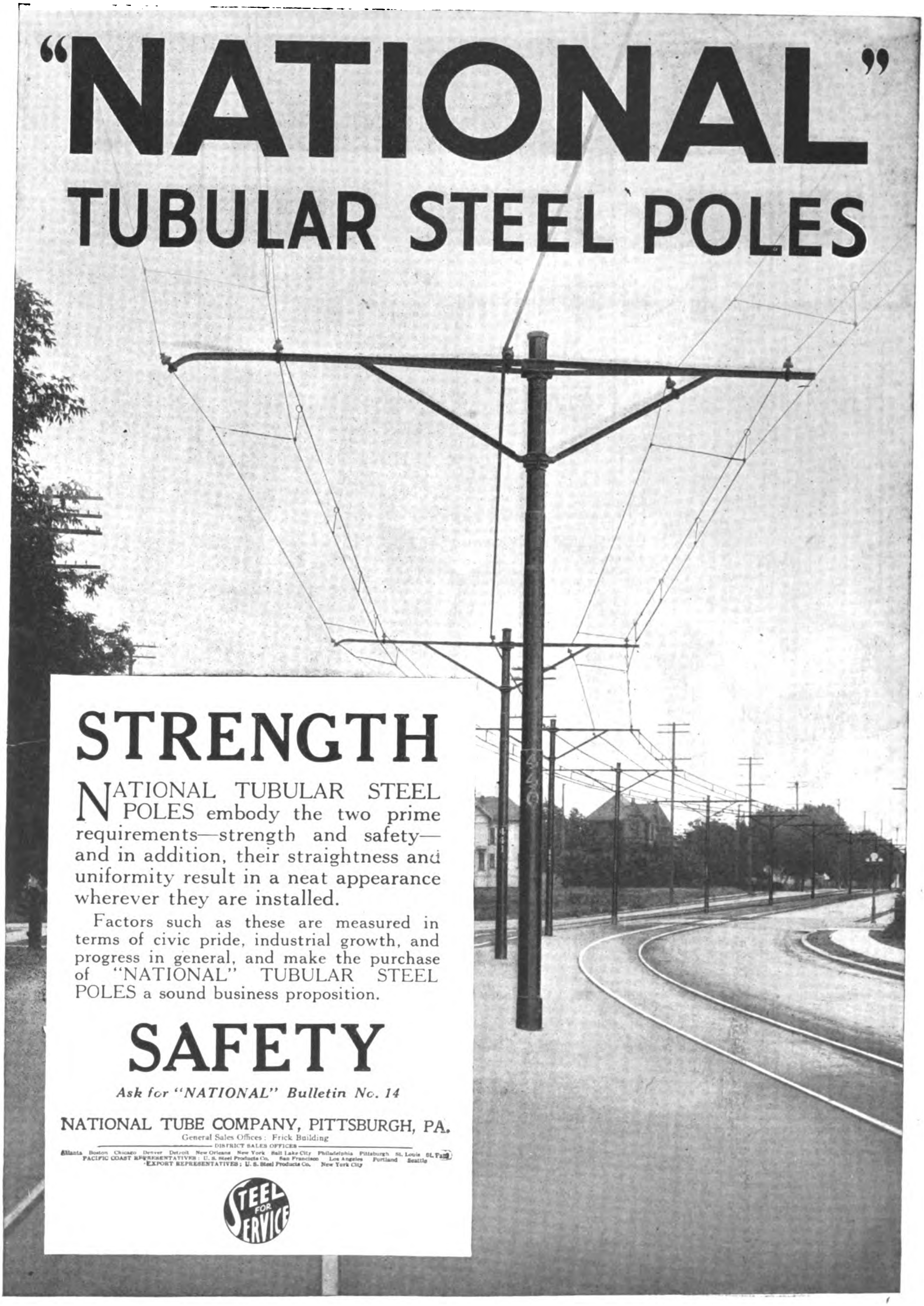
Write today

NATIONAL PNEUMATIC CO.
Incorporated
Originators and Manufacturers
***Principal Office:* 50 Church St., New York**

Philadelphia—Colonial Trust Bldg.
Chicago—McCormick Building
Works—Rahway, New Jersey

Manufactured in Canada by
Dominion Wheel & Foundry Co., Ltd., Toronto, Ont.





"NATIONAL"
TUBULAR STEEL POLES

STRENGTH

NATIONAL TUBULAR STEEL POLES embody the two prime requirements—strength and safety—and in addition, their straightness and uniformity result in a neat appearance wherever they are installed.

Factors such as these are measured in terms of civic pride, industrial growth, and progress in general, and make the purchase of "NATIONAL" TUBULAR STEEL POLES a sound business proposition.

SAFETY

Ask for "NATIONAL" Bulletin No. 14

NATIONAL TUBE COMPANY, PITTSBURGH, PA.
General Sales Offices: Frick Building
DISTRICT SALES OFFICES
Atlanta Boston Chicago Denver Detroit New Orleans New York Salt Lake City Philadelphia Pittsburgh St. Louis St. Paul
PACIFIC COAST REPRESENTATIVES: U. S. Steel Products Co., San Francisco Los Angeles Portland Seattle
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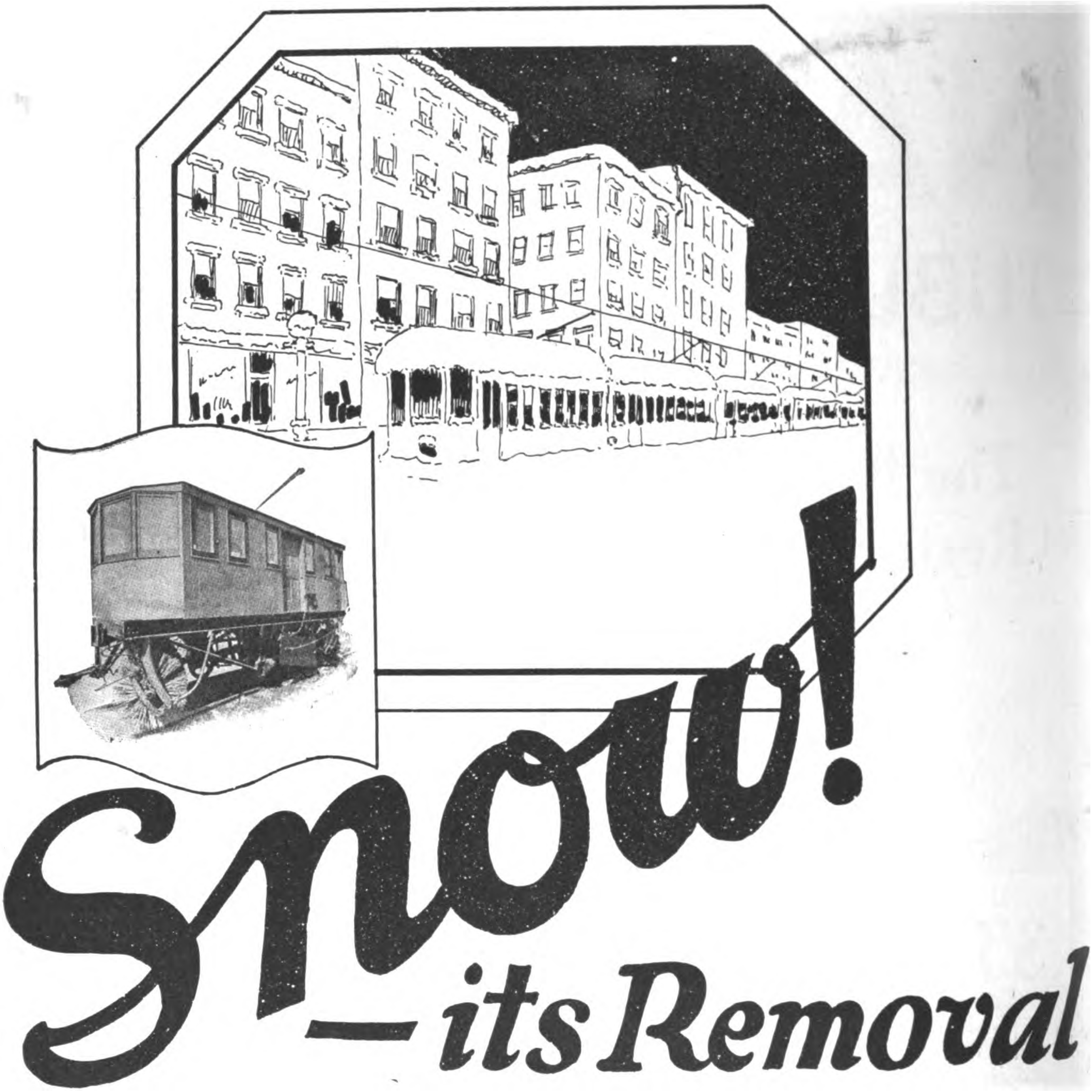
STEEL FOR SERVICE



As you read this your immediate problems may not, probably don't in fact, include snow. Yet in the back of your head you undoubtedly are lining up a plan for your next Winter's campaign for keeping tracks open and headways unimpaired. You're not going to wait for snow before you get ready to fight it.

Let us, therefore, remind you that approximately ninety-five per cent of all the electric snow sweeping equipment used in the United States and Canada is of McGuire-Cummings make. McGuire-Cummings sweepers *keep* tracks clear. When it starts to snow they start to sweep—that's all there is to it. Depend upon McGuire-Cummings sweepers for the solution of your snow problem next Winter.

McGUIRE-CUMMINGS MFG. CO.
General Offices
111 West Monroe St., Chicago, Ill.

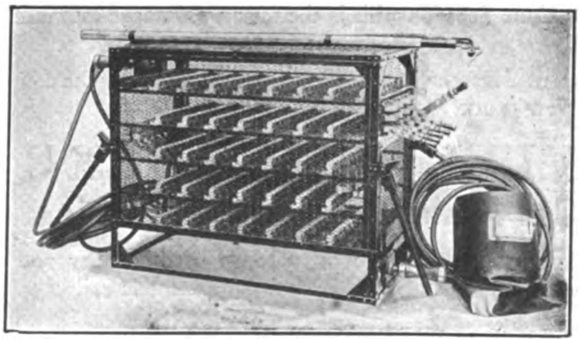
City and Interurban Cars and Trucks, Safety Cars, Combination and Work Cars,
Snow Sweepers, Electric Locomotives

Longer life
to tracks
and cars—

The Reciprocating Track Grinder Restores Smooth Surface to Rail

The Reciprocating Grinder removes corrugations not merely by grinding the rail to a flat, smooth surface, but by adapting itself to the shape of the original rail head. It thereby restores the rail to its original contour. This produces the most desirable result with no waste of metal thru excessive grinding.

The fact that it is used by hundreds of companies and further that some companies have as many as 16 of them in their track maintenance departments, is sufficient proof of their ability to perform their duty well.



Atlas Electric Arc Welder

Compact, portable, simple to operate and maintain. Produces a deep, strong weld with the lowest trolley voltage. The most modern and practical resistance welder on the market.

Atlas Rail Grinder

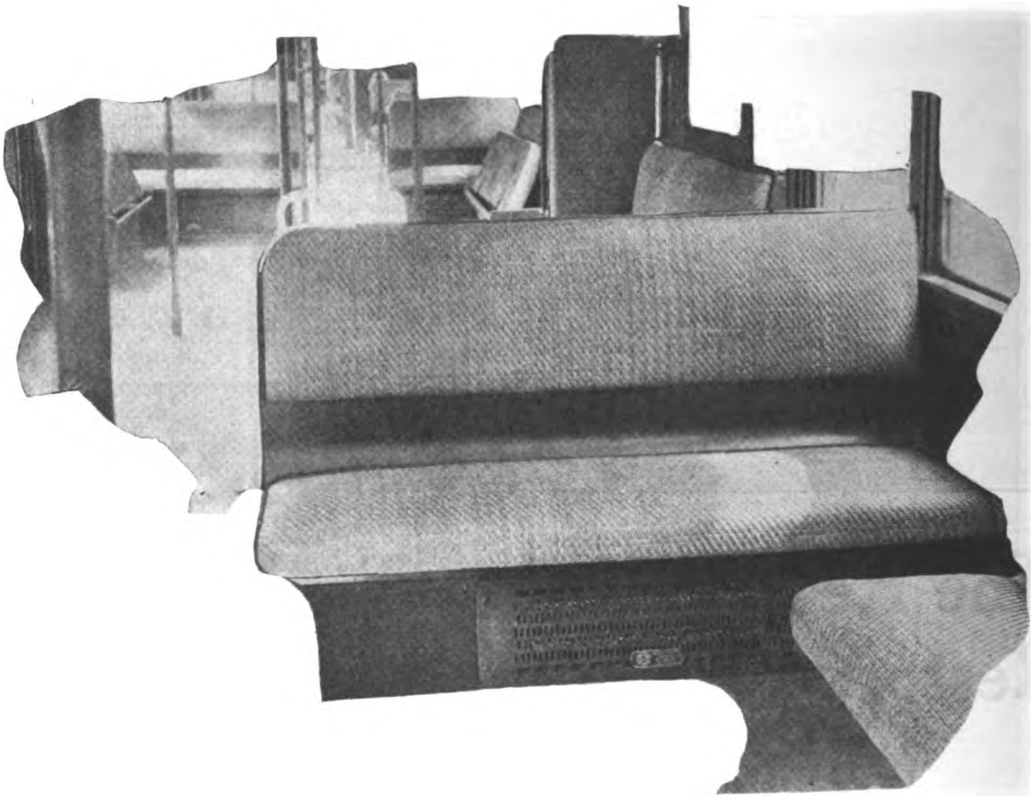
Low cost, economical rotary grinder for removing surplus metal after building up joints or special work with "AJAX" Welder. Extremely simple to operate and maintain.

RAILWAY TRACK-WORK COMPANY

3132-48 E. Thompson St., Philadelphia, Pa.

AGENTS:

Chas. N. Wood Co. Boston	Electrical Engineering & Mfg. Co. Pittsburgh	Atlas Railway Supply Co. Chicago	P. W. Wood New Orleans	Equipment & Engineering Co. London



Cane Seat Varnish for Service

Nothing is more attractive than cane seating material when it's fresh and clean and new. And nothing is more repellent when it is black and soiled and grimy.

Beckwith-Chandler Cane Seat Varnish is especially made to be applied on cane seats after the dirt and grime have been removed.

It brightens and preserves the rattan covering.

It will dry hard over night.

It will not soften up under wear and service to soil passengers' garments.

Beckwith-Chandler Cane Seat Varnish is the only product of its kind on the market.

For over five years used as the standard cane seat finish on the big railway cars of a New York Municipal Railway.

BECKWITH - CHANDLER

Railway Car Finishers and Specialties

Products which have proved their worth in terms of durability and economy on the cars of many well-known steam and electric railways.

Railway Pale Durable Body
Inside Car Finishing Varnish
Cane Seat Varnish
Truck Enamel
(black or colors)
Canvas Roof Paint
Railway Outside Enamels
(all colors)
Railway Inside Enamels
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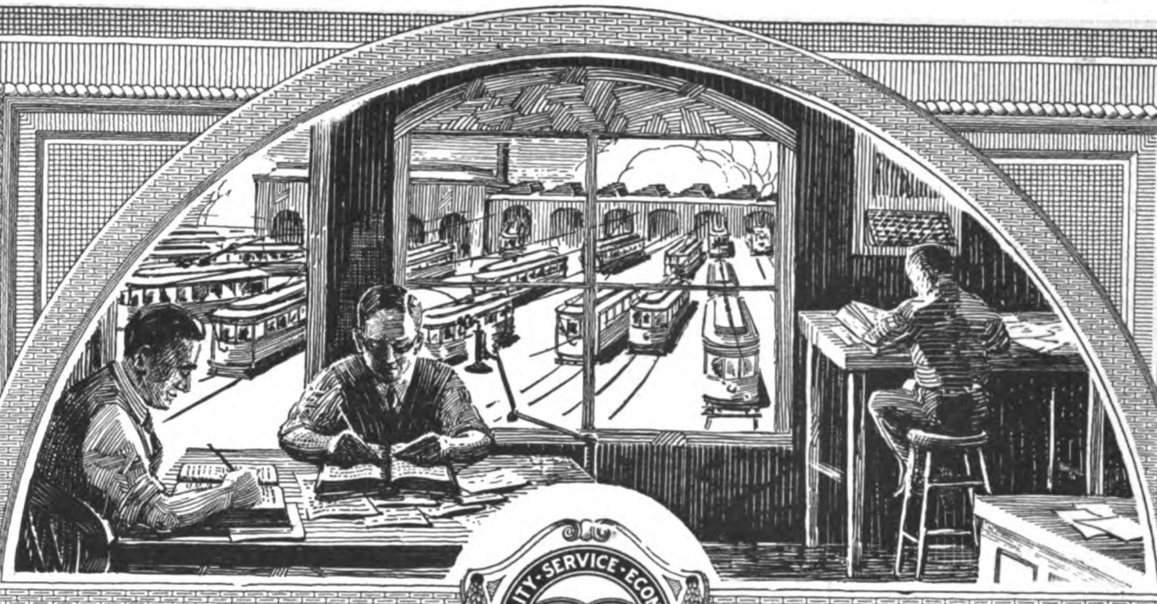
BECKWITH-CHANDLER Co.
193-211 Emmett Street, Newark, N. J.
320 Fifth Ave., New York, N. Y.



EVIDENCE

Galena Electric Railway Lubricants have an enviable record of accomplishment. Their reputation for efficiency and economy has been earned in the open field of practical service. They have repeatedly demonstrated their ability in tests with other oils.

In every section of the country, Galena Oils are in daily use on the power house and rolling equipment of electric railroads—not merely on a few isolated properties, but on hundreds, including the largest and heaviest traffic carrying lines. Their records of performance in mileage, freedom from bearing troubles and in making possible better operating conditions, may be found in the reports of any road under Galena lubrication.

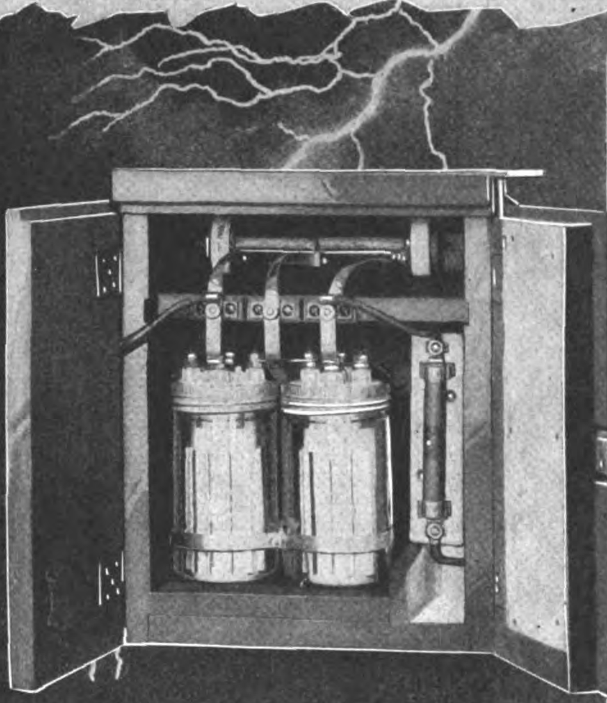
These reports are usually available to other roads and should furnish a reliable source of comparison to roads engaged in similar service. They may safely be accepted as real evidence that should far outweigh general assertions. We will gladly refer you to Galena lubricated equipment comparable with yours.

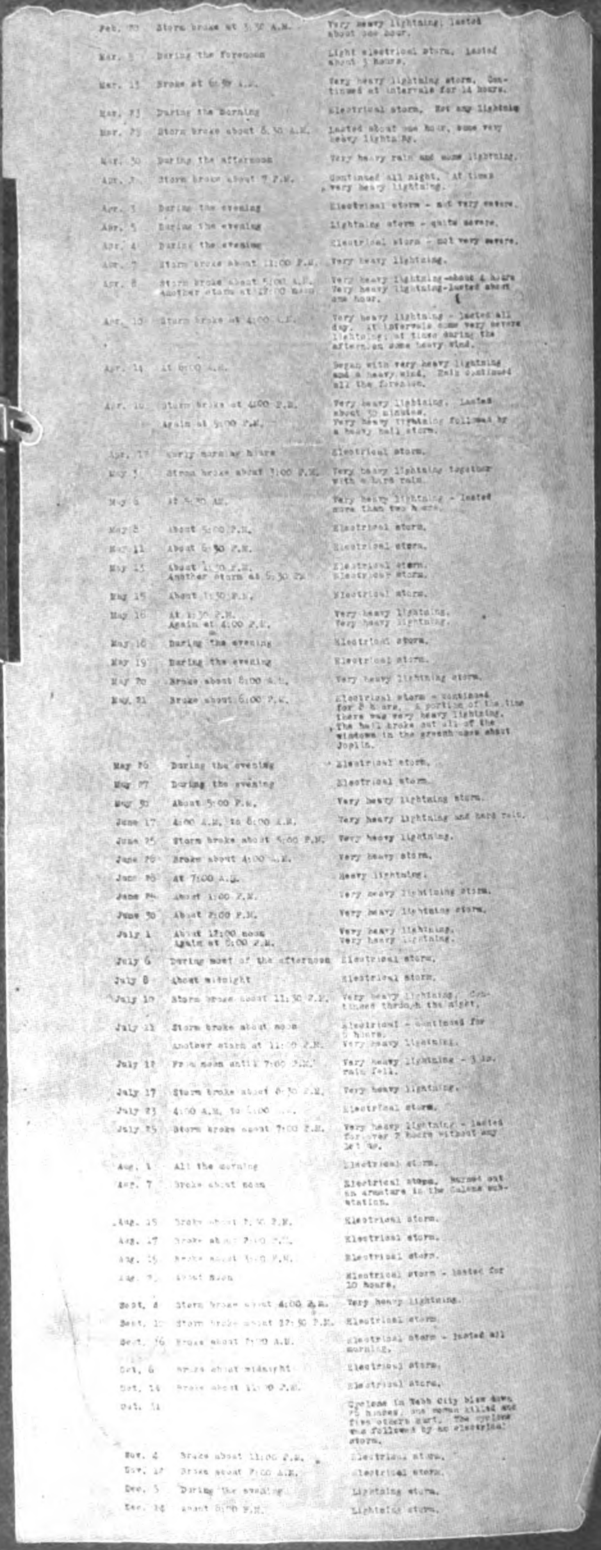
"Day by day — in every way
You'll find Galena Service pay!"

Galena-Signal Oil Company
New York - Franklin, Pa. Chicago
and offices in principal cities

LIGHTNING STORMS DURING THE YEAR 1922

Date	Time	Remarks
Jan. 4	Storm broke about 3:00 A.M.	Lasted about one hour. High wind blew down a couple of poles on Broadway line.





Have your equipments such a record?

The Southwest Missouri Railroad Company, Webb City, operates 59 cars. Each is protected with General Electric D-C. Aluminum Arresters. During 1922, sixty nine electrical storms threatened these equipments. Not a single equipment was damaged.

You can also have absolute protection. Consult the nearest G-E Sales Office.

General Electric Company
Schenectady, N. Y.
Sales Offices in all large cities

GENERAL ELECTRIC

New York, Saturday, August 4, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

Henry W. Blake and **Harry L. Brown**, *Editors*

Volume 62
Number 5

President Harding Passes On

ELECTRIC railway men will feel that they have suffered a tremendous loss in the death of Warren Gamaliel Harding, for aside from the admiration of his great statesmanship, they feel the industry has had something of a personal friend in him. Ever since his address as U. S. Senator before the Midyear meeting of the American Electric Railway Association in Cleveland in 1920, they have felt that in Harding they had a man who comprehended the problems and the accomplishments of the electric railways and who appreciated their contribution to present-day life. Since that Cleveland speech he has had the greatest good will and support, almost to a man, of the electric railway industry.

His reappearance before a meeting of electric railway men has been sought again and again, not so much because of the value from a publicity standpoint but because it was desired to hear words of wisdom and understanding from him again. He has expressed a sincere desire to accept these invitations, but more important things have commanded his time. Last February in Washington he received a group of the principal executives of the industry and chatted with them in his friendly way for a few minutes, as recorded in the JOURNAL at that time.

There is this consolation. The great things that President Harding has done in bringing the White House close to the people, in pursuing his policy of more business in government and less government in business, of making the government truly helpful to business, in reducing the cost of government—these things have received such an impetus at his hands that they will live on after him for a long time to come. There is another consolation for electric railway men in the fact that Calvin Coolidge, who succeeds to this high office, has also shown his interest in the electric railway industry and his sympathy with its special problems.

Mr. Coolidge was Lieutenant-Governor of Massachusetts in 1916, 1917 and 1918 and Governor in 1919 and 1920, and it was during these years that the acts recognizing the dependence of the public on good electric railway transportation were passed by the Massachusetts Legislature. While Governor in 1920, Mr. Coolidge was called upon in a very definite way to carry out the intent of these acts, when the trustees of the Eastern Massachusetts Street Railway discontinued service in Salem, Peabody and neighboring towns because of jitney competition. The Governor was asked by the mayors of these cities to remove the trustees, but he pointed out that the public could have only such service as it was willing to pay for. Then, after a conference arranged by him, the jitneys were withdrawn and electric railway service resumed. This was shortly after Mr. Coolidge took his famous action in connection with the strike of the Boston policemen. That the new President's interest in good transportation has continued was shown in his address delivered February 16, 1923, at the Midyear meeting of the American Electric Railway Association.

In President Coolidge the country will have as chief executive a sound thinker who is not afraid to follow where he feels that duty leads.

Public Service Shuts Down—Will the Industry Suffer?

AS A RESULT of a strike of all trainmen and maintenance employees, the Public Service Railway has put up its 1,500 cars serving 147 New Jersey communities, has discharged several hundred of the monthly payroll employees and apparently has entrenched itself for a long period of idleness if necessary. The exact course upon which the company has embarked is not disclosed, but the outcome is one of concern to the whole industry.

The public's interest in the issue between the railway and its men has been eclipsed by the determined effort of the buses to demonstrate their ability to replace trolleys for mass transportation in a number of large communities. The union officer supervising the situation for the trainmen charges that the company is in a plot to force elimination of the jitneys by leaving the people without service. If such is the case, the men could not be more short sighted than to strike now, for their jobs are certainly in jeopardy if the jitneys prove able to handle the business.

If this is the plan of the company, the outlook is not any too cheering. There is probably no place in the country where the buses would have a better possibility of being able to provide reasonably adequate service as substitutes for the cars. They were already organized and operating to such an extent that they hauled 141,326,123 passengers in ten cities in 1922, as against 325,265,180 revenue passengers carried by the entire railway system. And this bus service is provided in an orderly, supervised manner with about 1,400 reasonably good buses. Taking into account the large number of people who can walk to the network of steam lines, and to the tubes and the ferries, the additional buses required to provide the entire transportation service are less than would be the case elsewhere under the more usual travel conditions.

Furthermore, the railway seems to have accumulated a disfavor extending with lamentable completeness throughout the territory. This is now reflected in the fact that most of the mayors, the Newark director of safety, the supervisor of traffic and other public officials are doing everything in their power, seemingly, to make the present test of the buses a success.

So if it is to force elimination of the buses that the railway has ceased operation, there may well be some misgivings about the result, for even an approximation of the equivalent of the railway service would be heralded in many quarters as complete success, and the peculiar circumstances which made this possible there would not be taken into account in applying that example to another situation totally different.

Misrepresentation Concerning Accidents Is Harmful

A PROMINENT transit official in New York City recently declared that the greatest danger on the transit lines of the city was that of panic among the passengers. While this danger can never be wholly eliminated where many passengers are closely confined in crowded vehicles, nevertheless the evil would be mitigated if the public were more accurately informed. Newspapers are prone to feature every railway accident. Unfortunately they not only feature but often entirely misrepresent its cause and effect. The horrors and the dangers of electric railway travel are exaggerated to a point where one wonders that the timid dare ride at all. One reads of choking sulphur fumes rising from burning insulation. Sheets of flame are said to leap from end to end of a car when the controller burns up. When a trolley wire drops in the street balls of fire fly in all directions. Such descriptions, while good newspaper copy, are not facts.

The reaction of an electric railway man to misrepresentations of this sort may be only one of amusement. He is familiar with his equipment, and separates the true from the false in the press story. But the reaction upon the general public is far different. The average man knows very little about electricity except that it is a powerful force, and he readily believes the wildest stories concerning its manifestations. Real harm is therefore done by inaccurate newspaper accounts of trifling mishaps. The electric railway impresses the passenger, not as the safest means of urban transportation, which it really is, but as a fearful and wonderful thing. Would it not pay the railway to counteract this tendency by furnishing the newspapers with such complete and accurate information that there would be no excuse for misrepresentation.

Why Jersey Central Traction Has Been Abandoned

WHAT is the true significance of the recent cessation of operation by the Jersey Central Traction Company? A careful study of the situation leads inevitably to the conclusion that the railway failed because it was never really needed. Nearly 40 miles of track were laid to serve a population which in 1910 numbered only 22,350. It was the expectation of the original builders that the territory would develop and the population increase. In 1920, however, the population was only 37,324. That the growth has not been more rapid is due largely to the physical characteristics of the region, the greater part of which is not such as to encourage permanent development.

Due to widespread use of private automobiles, the railway traffic has not even kept pace with this small increase in population. The roadbed was very uneven and poorly maintained. Service was infrequent and comparatively slow. The main line headway during the greater part of the day was one hour which was infrequent considering the short average length of ride. Until recently most of the rolling stock was old in design, dingy in appearance, and badly kept up. Under these circumstances, it is hardly surprising that the riding went largely to private automobiles. Bus competition did not play a very important part in the trouble suffered by the company.

One of the greatest handicaps from which the railway suffered was the low and marshy character of the land. It was extremely difficult to keep the track foundation in good condition and a great deal of trestle work which was necessary entailed heavy maintenance expense.

Thus it appears that the road should never have been built; that the service was such as not to attract the full patronage of the riders available; and that physical conditions worked against low operating costs. In short, the Jersey Central Traction Company was one of those promoters' railroads, the disappearance of which must be expected under present-day conditions. It was founded upon hopes rather than upon facts. Such a road in passing leaves no blemish on those lines which were built to render service, but its passing needs this explanation and interpretation for those who would look upon it as another example of the demise of the railway.

New Cars Make It Easier to Sell Transportation

THE electric railways in Lexington, Ky., and Huntington, W. Va., are completely replacing their present obsolete rolling stock with new cars. The situations are explained in an article by "Spectator" in this issue. These replacements are being made as part of a new effort to place the respective railways on a profitable basis. Experience thus far indicates that they will greatly assist in doing so.

The industry has been through an era of car remodeling in the last few years, and a great deal of this work is still in progress. In many cases it is necessary, but is of doubtful expediency in all cases where the old cars can possibly be discarded and new ones bought. In Lexington, cars remodeled for one-man operation have been in use for some time, but a way has been found to procure a complete new supply of cars in view of their prospective profitableness. An old house, an old shoe, an old automobile or an old electric car is still old, no matter how much it is repaired and painted. It cannot but appear what it is—"patched." When a car becomes run down and out of date, the economic limit of repair is soon reached. Furthermore, an old car has little value as an aid in selling transportation, whereas a new car sells its way.

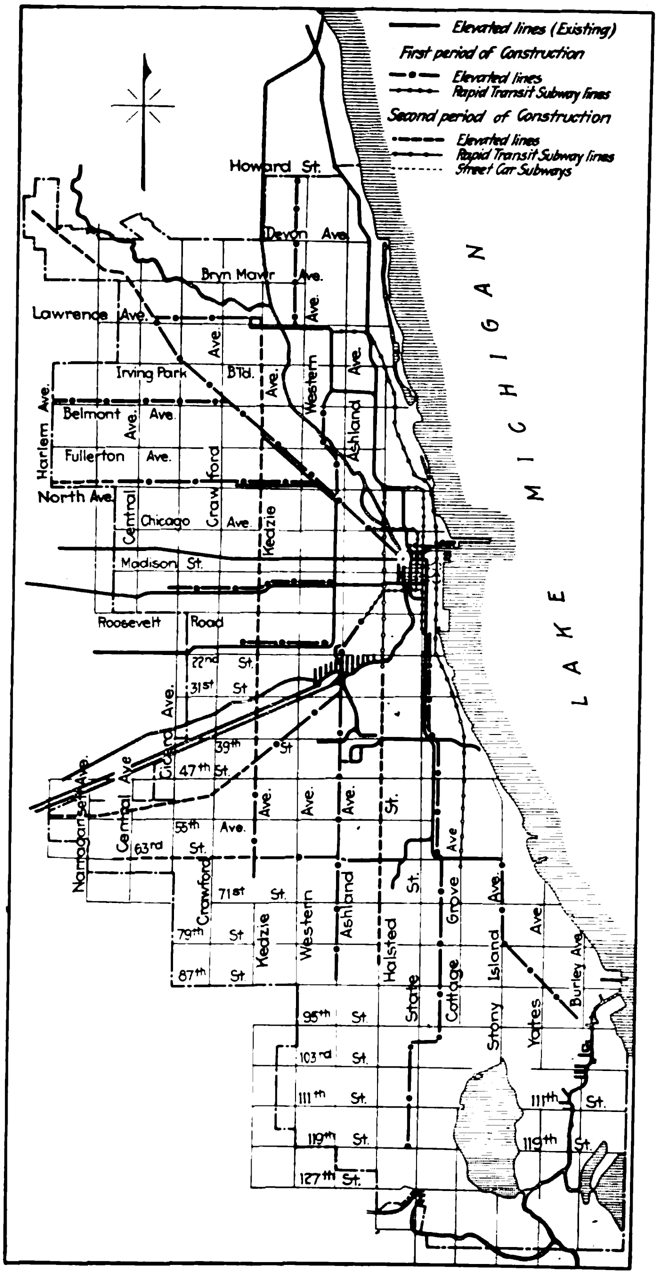
The increased demand for new cars during the past eighteen months indicates that the truth of the above is being appreciated. Before deciding on that next big car rehabilitation job, would it not be wise to consider all of the advantages of scrapping the old cars and buying brand new ones? In so doing it would seem advisable to give serious consideration to a type of construction designed for a ten year probable life instead of adding weight and cost for the purpose of obtaining a 30 year life, with the prospect of additional future heavy overhaul and remodeling costs to keep the long-life car up to the demands of changing service requirements.

$372,833,000 Construction Proposed for Chicago

Details of the Kelker Report Show Extensions to Rapid Transit and Surface Lines Throughout the City—The Plan Is Divided into Two Periods to Get Benefits Sooner—Time Savings in All Parts of the City Are Shown

THE general outline of plans for a unified transportation system presented to the City Council of Chicago by R. F. Kelker, Jr., its consulting engineer, were given in an article published in this paper July 14. The present article deals with the recommended construction program through which the development of the unified system is to be effective.

While the general appearance of the plan recommended is similar to that proposed by the 1916 Traction and Subway Commission, the layout of the principal routes, and particularly the connections in the central business district, differ in the essential arrangements from that plan. The proposals made by Mr. Kelker provide for a unified system of elevated, subway and surface lines based on forecasts of the growth of population and traffic demands up to 1950, and are considerably more comprehensive.



Elevated lines (Existing)
First period of Construction
Elevated lines
Rapid Transit Subway lines
Second period of Construction
Elevated lines
Rapid Transit Subway lines
Street Car Subways
Howard St.
Devon Ave.
Bryn Mawr Ave.
Lawrence Ave.
Ave.
Irving Park Blvd.
Western
Ashland Ave.
Harlem Ave.
Belmont Ave.
Fullerton Ave.
Crawford
North Ave.
Central
Chicago Ave.
Kedzie
Madison St.
Roosevelt Road
22nd St.
31st St.
39th St.
47th St.
55th Ave.
63rd St.
71st St.
79th St.
87th St.
95th St.
103rd St.
111th St.
119th St.
127th St.
Narragansett Ave.
Cicero Ave.
Halsted St.
State St.
Cottage Grove Ave.
Stony Island Ave.
Yates Ave.
Burley Ave.
111th St.
119th St.
LAKE MICHIGAN

Rapid Transit Lines at the End of the First and Second Periods

The portions of this plan required immediately have been grouped in the first period of construction, the remaining portions being planned for a second period.

In the opinion of the engineer the construction outlined provides a complete physical plan for the entire city. The wide distribution of population in Chicago requires that great care be used in projecting rapid transit lines, particularly to avoid heavy concentrated investments which can serve but comparatively few car riders. It is obvious that any construction which requires an excessive investment limits the development of the system as a whole and, therefore, limits the number of people served.

The elevated railways now operate over thirteen tracks outside of the central business district, and all of this service is concentrated upon two tracks on the Union Elevated loop. The elevated lines have a latent service capacity which will be available when this restriction is removed. The key to the solution of the elevated terminal problem is found in providing four tracks through the central business district for North Side and South Side trains and by devoting the two tracks of the Union Loop in Van Buren Street, Wabash Avenue and Lake Street to the exclusive use of West Side trains. This will be accomplished by the construction of a high level two-track subway in State Street and North Avenue from a connection with the South Side Elevated near Sixteenth Street to a connection with the Northwestern Elevated near Orleans Street and by the construction of a two-track elevated railroad in Wells and Polk Streets from a connection with the Union Loop at Wells and Van Buren Streets to a connection with the South Side elevated at the alley west of Wabash Avenue.

To secure full track capacity existing crossings on the same level on Wells Street at Lake Street and Van Buren Street will be eliminated. The Lake Street tracks will be elevated over the Wells Street tracks at Lake and Wells Streets, and the Wells Street tracks will be elevated over the Metropolitan Elevated tracks at Wells and Van Buren Streets, thereby separating the grades and removing interference from West Side trains.

FIRST PERIOD OF CONSTRUCTION

The existing surface and elevated lines and also the rapid transit construction (subway and elevated) recommended for the first period of construction are shown in the map on this page. The central portion of the city is shown in greater detail on page 170.

The principal subways proposed are one on State

Street, which will connect the North Side and the South Side of Chicago, forming with the existing elevated railroad a four-track rapid transit trunk line from Sixty-third Street to Howard Street. This will provide transportation through the area just north of the Chicago River now practically without rapid transit service and also will afford a convenient means of reaching Lincoln Park.

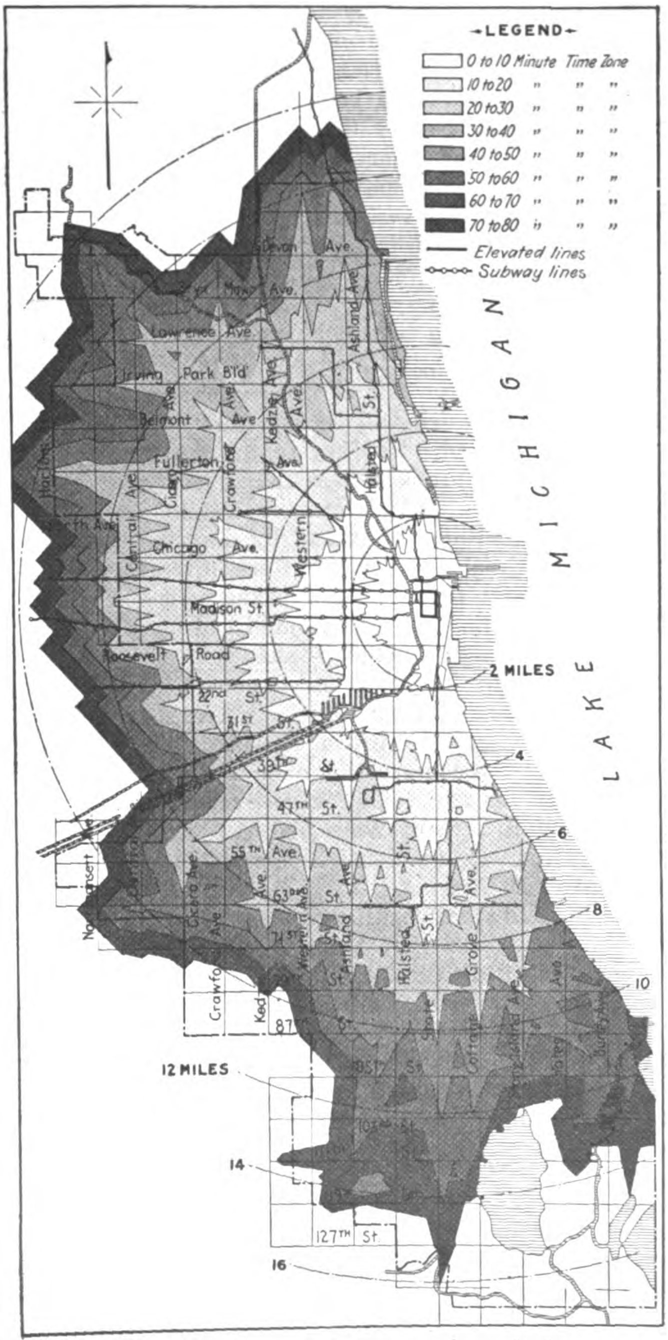
The Clark Street subway will be used to provide maximum transfer facilities by a connection through the central business district, between an elevated line along Milwaukee Avenue to the northwest and one on Blue Island and Archer Avenues to the southwest. This line will consist of two tracks in the outer portion with two additional loading tracks in the subway in Clark Street between Harrison Street and Randolph Street to provide ample facilities in this heavy loading district.

ELEVATED RAILROADS

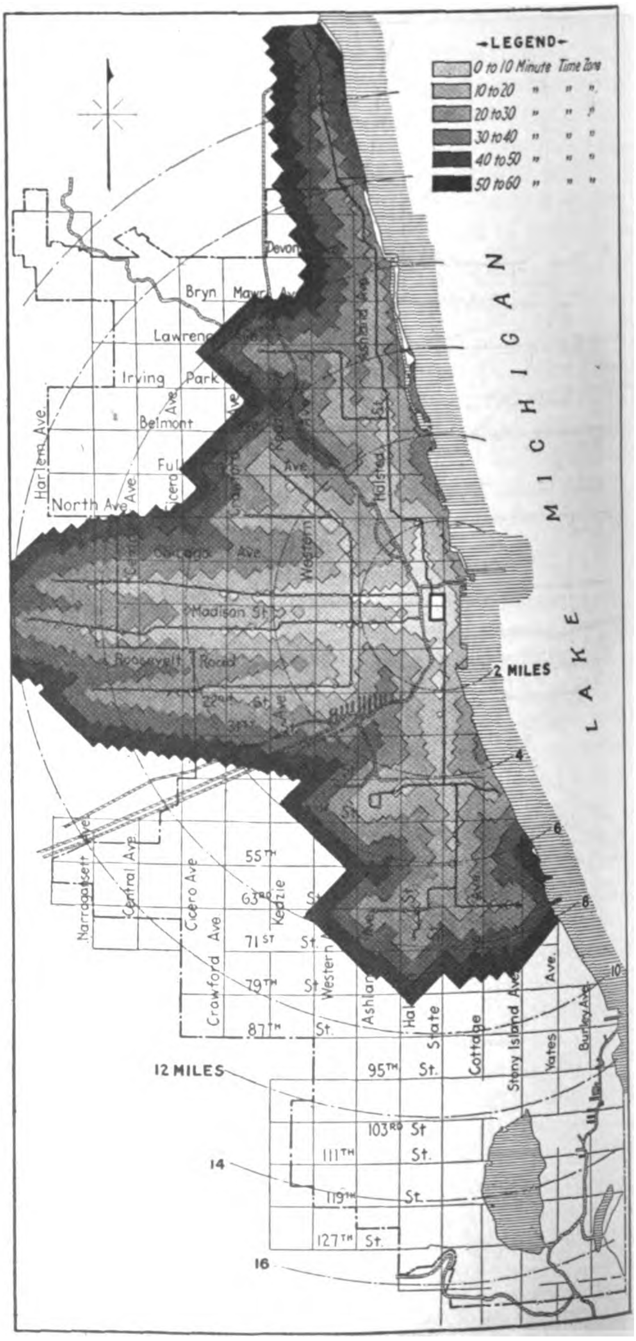
One of the most serious deficiencies of the existing elevated railroad systems, states the engineer, is the lack of a north-and-south trunk line located west of the Chicago river. He concurs in the recommendation of the Chicago Traction and Subway Commission for a line serving Ashland Avenue as a through north-and-south artery of travel, which is designed to divert between 20 and 25 per cent of the Union Loop traffic. This line will intersect and afford transfer facilities with eight rapid transit lines and will also intersect thirty-seven street car lines. It will be a rapid transit elevated railroad extending from Eighty-seventh Street in the southern section of the city to Howard Street in the northern section.

Other important elevated construction recommended for the first period of construction, in addition to the lines on Milwaukee, Blue Island and Archer Avenues, are branches of the Milwaukee Avenue trunk on North and Belmont Avenues, and extensions of the South Side Elevated parallel to State Street as far as Pullman, and along Stony Island and South Chicago Avenues to South Chicago.

The single piece of new elevated construction recom-


LEGEND
0 to 10 Minute Time Zone
10 to 20 " " "
20 to 30 " " "
30 to 40 " " "
40 to 50 " " "
50 to 60 " " "
60 to 70 " " "
70 to 80 " " "
Elevated lines
Subway lines
LAKE MICHIGAN
Devon Ave.
Bryn Mawr Ave.
Lawrence Ave.
Irving Park Bl'd
Belmont Ave.
Fullerton Ave.
Chicago Ave.
Madison St.
Roosevelt Road
22nd St.
31st St.
39th St.
47th St.
55th Ave.
63rd St.
71st St.
87th
103rd St.
127th St.
Central Ave.
Cicero Ave.
Crawford Ave.
Kedzie Ave.
Western Ave.
Ashland Ave.
Halsted St.
State St.
Cottage Grove Ave.
2 MILES
4
6
8
10
12 MILES
14
16

Time Zones for the Surface Lines—1922


LEGEND
0 to 10 Minute Time Zone
10 to 20 " " "
20 to 30 " " "
30 to 40 " " "
40 to 50 " " "
50 to 60 " " "
LAKE MICHIGAN
Devon
Bryn Mawr Ave.
Lawrence
Irving Park
Belmont
North Ave.
Harlem Ave.
Chicago Ave.
Madison St.
Roosevelt Road
22nd St.
55th
63rd
71st St.
79th St.
87th St.
95th St.
103rd St
111th St.
119th St.
127th St.
Narragansett Ave.
Central Ave.
Cicero Ave.
Crawford Ave.
Kedzie
Western
Ashland
Halsted
State
Cottage
Stony Island Ave.
Yates
Burley Ave.
2 MILES
4
6
8
10
12 MILES
14
16

Time Zones for the Elevated Lines—1922

These charts show the time to reach any part of the city, starting at the center of the Loop, by either of the present independent transportation systems.

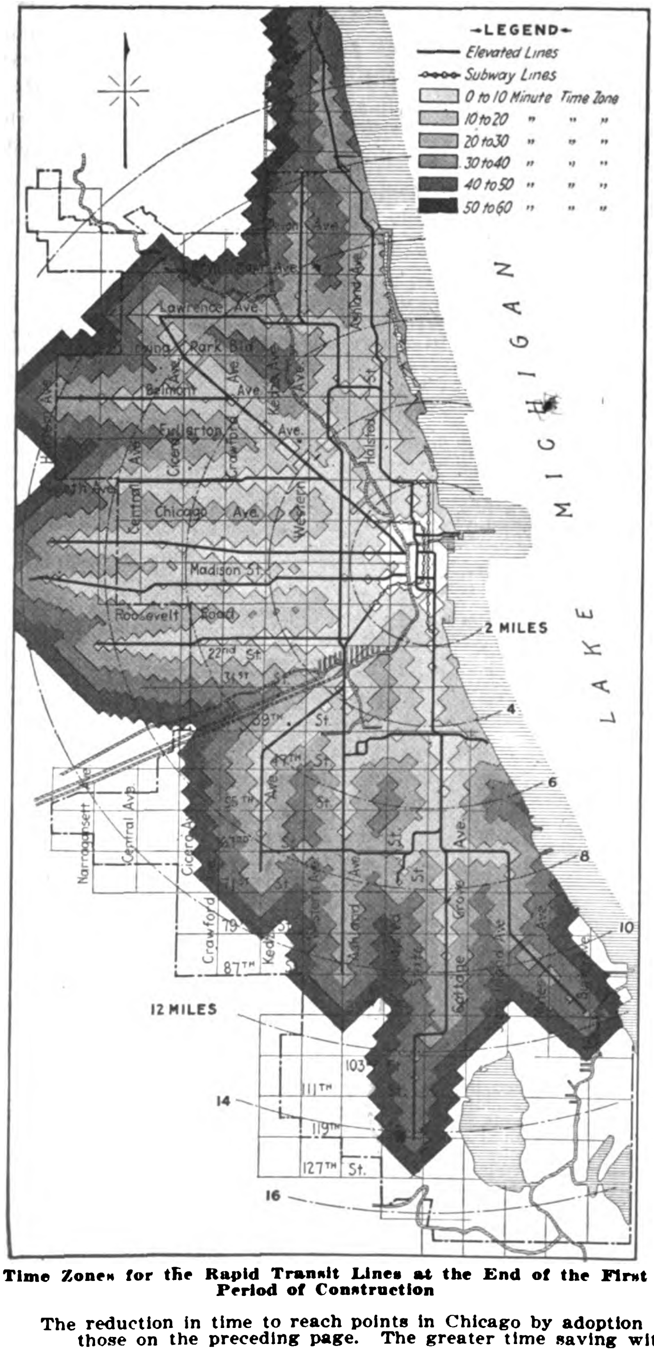
mended in the central business district will be a connecting link, consisting of a four-track rapid transit line for north-and-south service, consisting of three parts: (a) The existing Northwestern Elevated tracks in Wells and Franklin Streets lying between Orleans Street Junction with the State Street subway and Lake Street; (b) the Wells Street track of the Union Loop, lying between Lake Street and Van Buren Street and (c) a two-track elevated railroad in Wells Street from a connection with the Loop at Van Buren Street to Polk Street, and running then easterly in Polk Street to a junction with the Southside Elevated in the alley west of Wabash Avenue.

Tne engineer states that grade crossings on rapid transit lines materially reduce track capacity, and he recommends that the tracks of the branch line be raised over those of the main line at three points: Lake and Wells Streets, Van Buren and Wells Streets, and at the Ravenswood Junction just north of Belmont Avenue.

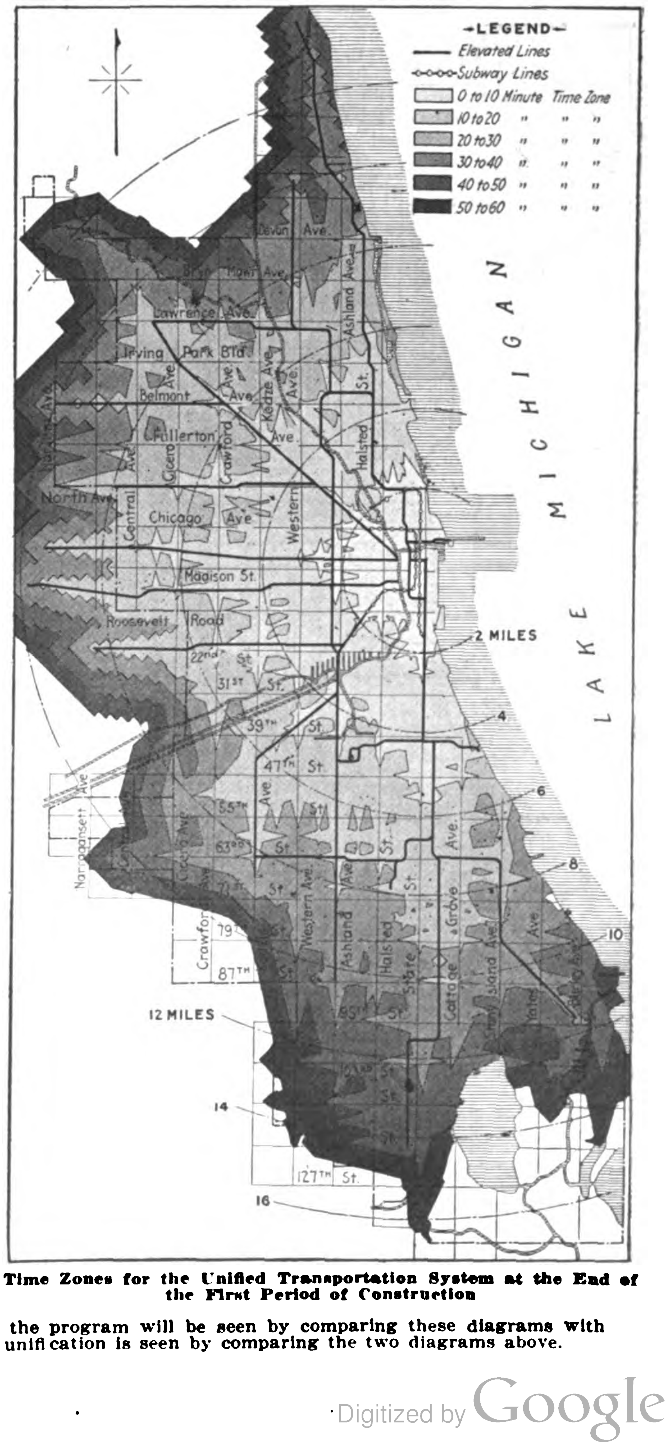
The rapid transit system described has been planned so as permit direct routing and to avoid duplication of service. Tentative schedules of the various routes have been prepared and track layouts designed so that control points or throats which would restrict the full and uniform use of track facilities have been avoided. Through routing of service from one extremity of the system to the other will be the basic principle of operation.

STREET RAILWAYS

The surface lines will be extended during the first period of construction by building 73 miles of double-track extensions and double-tracking 7 miles of existing single-track line. By the construction of these extensions street car service will be furnished in substantially all the built-up area of the city as well as many areas now developing. The engineer states that the proposed plan will reduce the length of the haul


LEGEND
Elevated Lines
Subway Lines
0 to 10 Minute Time Zone
10 to 20 " " "
20 to 30 " " "
30 to 40 " " "
40 to 50 " " "
50 to 60 " " "
LAKE MICHIGAN
Lawrence Ave.
Irving Park Bld.
Belmont Ave.
Fullerton Ave.
Chicago Ave.
Madison St.
Roosevelt Road
22nd St.
31st St.
39th St.
47th St.
55th St.
63rd St.
79
87th
103
111th
119th
127th St.
Central Ave.
Cicero Ave.
Crawford Ave.
Western Ave.
Ashland Ave.
Halsted St.
State St.
Cottage Grove Ave.
Narragansett Ave.
2 MILES
4
6
8
10
12 MILES
14
16

Time Zones for the Rapid Transit Lines at the End of the First Period of Construction


LEGEND
Elevated Lines
Subway Lines
0 to 10 Minute Time Zone
10 to 20 " " "
20 to 30 " " "
30 to 40 " " "
40 to 50 " " "
50 to 60 " " "
LAKE MICHIGAN
Devon Ave.
Bryn Mawr Ave.
Lawrence Ave.
Irving Park Bld.
Belmont Ave.
Fullerton Ave.
North Ave.
Chicago Ave.
Madison St.
Roosevelt Road
22nd St.
31st St.
39th St.
47th St.
55th St.
63rd St.
79
87th
95th
127th St.
Central Ave.
Cicero Ave.
Crawford Ave.
Kedzie Ave.
Western Ave.
Ashland Ave.
Halsted St.
State St.
Cottage Grove Ave.
Stony Island Ave.
Narragansett Ave.
2 MILES
4
6
8
10
12 MILES
14
16

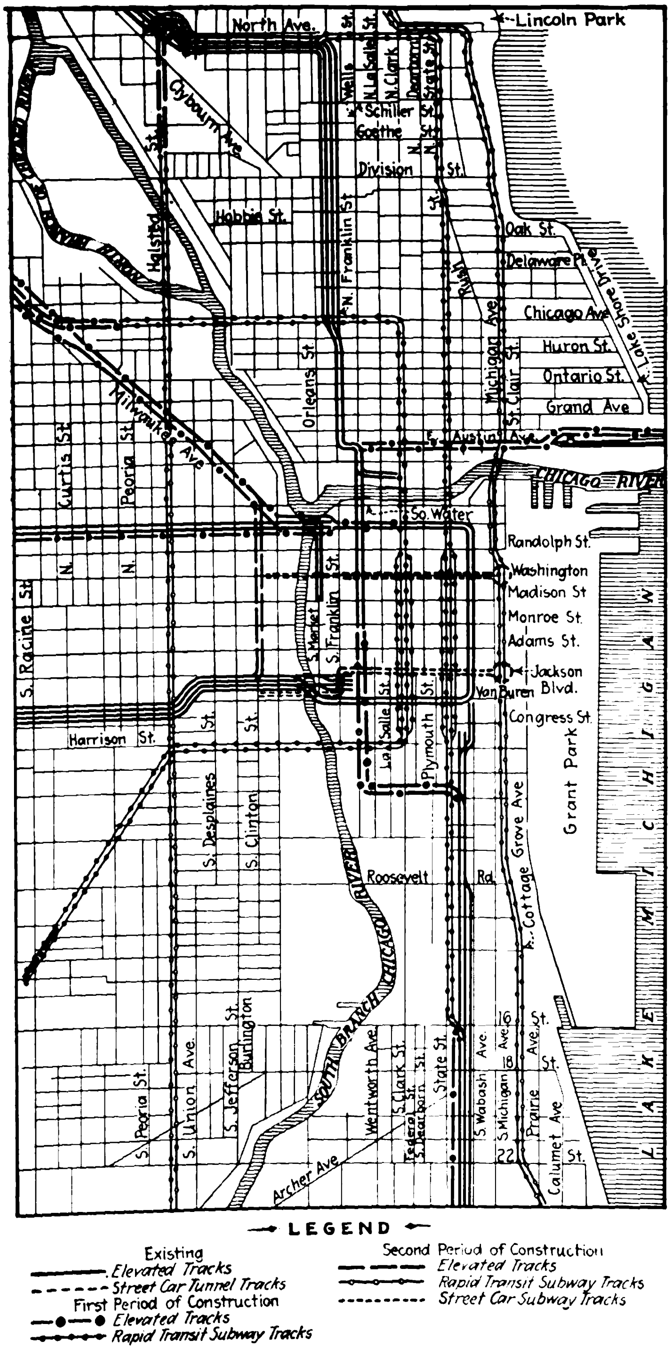
Time Zones for the Unified Transportation System at the End of the First Period of Construction

The reduction in time to reach points in Chicago by adoption of the program will be seen by comparing these diagrams with those on the preceding page. The greater time saving with unification is seen by comparing the two diagrams above.

and the cost of operation, as it is based upon unification and co-ordination of the elevated railroads and the surface lines. Using the surface lines as collectors and distributors of traffic, and developing a rapid transit network for mass transport with liberal transfer privileges will insure a substantial reduction in the length of haul on the surface lines and a corresponding reduction in cost of operation. Of the extensions recommended the principal ones are on Central Avenue, from Elston Avenue to Roosevelt Road, 8.5 miles of double track and on Western Avenue from Seventy-first Street to 119th Street, 6 miles of double track. These extensions will necessitate the purchase of additional cars. The type recommended will be of the most modern design, and the same general type as, but lighter than, most of the cars now in use on the surface lines.

SECOND PERIOD OF CONSTRUCTION

The principal rapid transit subways included in the second period are the Cottage Grove-Broadway Line, and the Halsted Street Line. These will both be high-level subways. The only subways recommended for surface cars are one under Washington Street and one under Jackson Street, both of which will connect with the existing tunnels under the South branch of the Chicago River. These will be low-level subways to pass under the north-and-south rapid transit subways.


North Ave.
Lincoln Park
Wells
N. LaSalle
N. Clark
Dearborn
N. State St.
Schiller St.
Goethe St.
Clybourn Ave
Halsted St.
Division St.
Hobbie St.
N. Franklin St.
Rush
Oak St.
Delaware Pl.
Lake Shore Drive
Chicago Ave
Huron St.
Ontario St.
Grand Ave
Michigan Ave
St. Clair St.
Orleans St.
Milwaukee Ave
Curtis St.
N. Peoria St.
E. Austin Ave.
CHICAGO RIVER
So. Water
Randolph St.
Washington
Madison St
Monroe St.
Adams St.
Jackson Blvd.
Van Buren
Congress St.
S. Racine St.
S. Market
S. Franklin St.
La Salle St.
South St.
Plymouth St.
Harrison St.
S. Desplaines St.
S. Clinton St.
Grant Park
Roosevelt Rd.
Cottage Grove Ave
SOUTH BRANCH CHICAGO RIVER
S. Peoria St.
S. Union Ave.
S. Jefferson St.
Burlington
Archer Ave
Wentworth Ave
S. Clark St.
Federal St.
S. Dearborn St.
State St.
S. Wabash Ave.
S. Michigan Ave
Prairie Ave.
Calumet Ave
16 St.
18 St.
22 St.
LAKE MICHIGAN
LEGEND
Existing
Elevated Tracks
Street Car Tunnel Tracks
First Period of Construction
Elevated Tracks
Rapid Transit Subway Tracks
Second Period of Construction
Elevated Tracks
Rapid Transit Subway Tracks
Street Car Subway Tracks

Subway and Elevated Tracks in the Central Area at the End of the Second Period of Construction

Of the elevated construction for the second period the Kedzie Avenue elevated probably will be the most important. This will be built on or near Kedzie Avenue from Sixty-seventh Street to Lawrence Avenue. The Halsted Street elevated and subway route will form a north-and-south rapid transit line between Eighty-fifth Street and North Avenue, where it will connect with the Northwestern Elevated.

The street railway construction recommended for this period consists of 48 miles of double track, principally extensions of lines either existing at present or to be built during the first period.

THE UNION ELEVATED LOOP

The engineer states that for many years the removal of the Union Elevated Loop structure has been urged. The principal reasons given for its removal are that it prevents the expansion of the business district, interferes with street traffic and also with the lighting of adjacent buildings. Having considered fully these objections, he states that it would be un-

ESTIMATE OF COST FOR COMPLETE PROGRAM FOR UNIFIED SYSTEM

First Period of Construction	
RAPID TRANSIT SUBWAYS	
State Street subway	$19,430,000
Clark Street subway	24,900,000
ELEVATED RAILROADS	
Mid-City trunk line	14,460,000
Milwaukee Avenue line	8,125,000
Belmont Avenue line	3,850,000
Humboldt Park line	4,099,000
Marquette Park line	6,210,000
Douglas Park line	1,730,000
Polk Street and Wells Street line	940,000
Southside Elevated main line	3,930,000
Roseland line	7,625,000
South Chicago line	3,770,000
Englewood line	2,090,000
Stock Yards line	400,000
Municipal Pier line	1,125,000
Northwestern Elevated main line	300,000
Ravenswood line	3,660,000
Grade separation	1,454,000
Oak Park line	2,555,000
Garfield Park line	2,450,000
Elevated stations	2,400,000
3,000 modern rapid transit cars	69,000,000
Substations, shops, yards and terminals	15,000,000
STREET RAILWAYS	
73.01 miles of double-track street railway lines	13,142,000
6.98 miles of single-track street railway lines	628,000
250 modern street railway cars	3,750,000
Substations and car stations	820,000
Total	$217,843,000
Second Period of Construction	
RAPID TRANSIT SUBWAYS	
Cottage Grove-Broadway line	$55,200,000
Halsted Street line	20,610,000
STREET CAR SUBWAYS	
Washington Street subway	3,345,000
Jackson Street subway	3,525,000
ELEVATED RAILROADS	
Kedzie Avenue line	10,000,000
Halsted Street line	6,500,000
Clinton Street line	635,000
Englewood line	3,260,000
Archer Avenue line	4,900,000
Humboldt Park line	1,010,000
Milwaukee Avenue line	3,810,000
1,200 modern rapid transit cars	27,600,000
Substations, shops, yards and terminals	6,000,000
STREET RAILWAYS	
47.75 miles of double-track street railway lines	8,595,000
Total	$154,990,000
Total estimate, first and second periods	$372,833,000

justifiable at the present time to substitute subways in lieu of this structure, at an expense of many milions of dollars. Undoubtedly the time will come when the congestion of street traffic will be so great as to compel its removal, so accordingly no construction has been recommended which would prevent its ultimate removal.

ESTIMATES OF COSTS

In order to avoid the expense of computing unit quantities, those which were determined by the Chicago Traction and Subway Commission in 1916 were used in the estimates of costs which were made under the supervision of H. M. Brinckerhoff of the firm of Parsons, Klapp, Brinckerhoff & Douglas.

The accompanying estimates do not include the cost of such real estate as may be necessary for rights of way.

BENEFITS OF THE UNIFIED SYSTEM

In addition to the benefits which will follow from the unification and expansion of existing transportation lines, other important benefits will be secured, according to the engineer. Rapid transit lines provide high speed and non-interrupted operation, which are two highly desirable service factors in transport. Time-zone maps, showing the time required to reach any point in the city from the Union Loop, have been made by the engineer. In preparing these maps the present running time for existing surface and elevated lines was used, and for proposed lines it was estimated. Time for making a transfer, or for reaching the surface from a subway or elevated train was estimated at one minute. The rate of walking was estimated at 3 m.p.h. Those reproduced in the engravings show the time required for existing surface lines, for existing elevated railroads, for the subway and elevated lines operating together at the end of the first period of construction, and for the unified system.

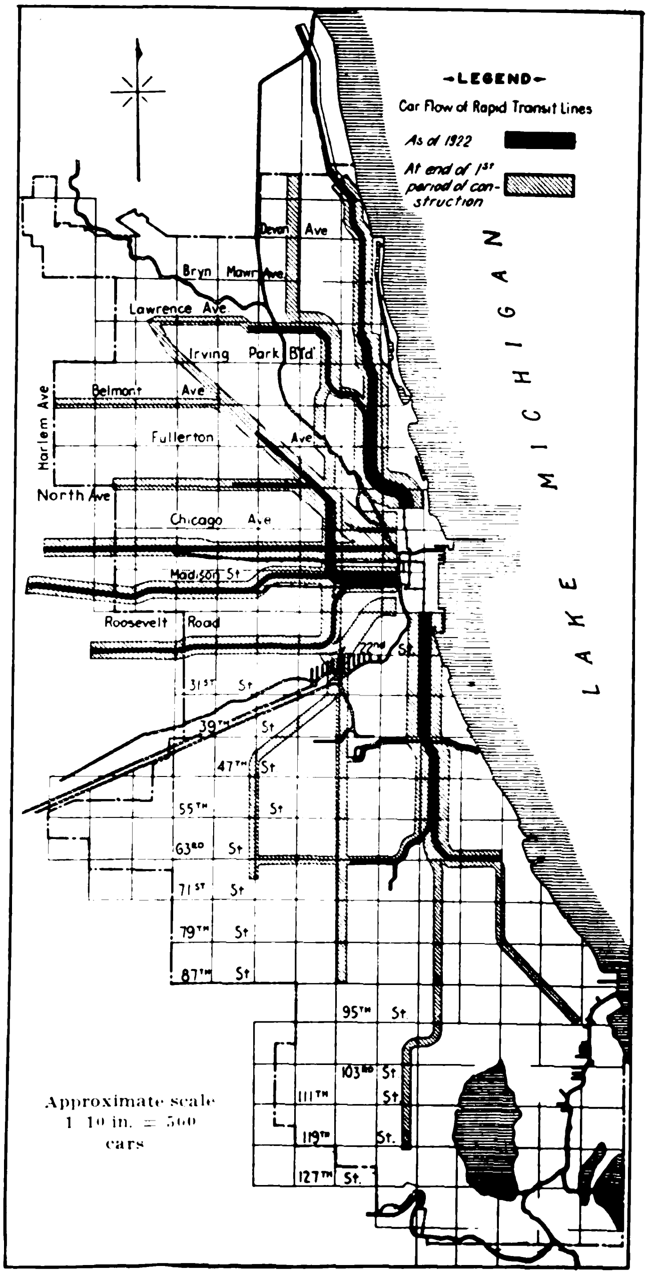
Starting at the Union Loop, points were located at five-minute intervals on every outbound transportation line and also along the intersecting lines to determine time contours. On the map for the surface lines it will be noted that the twenty-thirty-minute zone is approximately centered on the 4-mile arc, while the same zone for the unified transportation system is centered on approximately the 7-mile arc, thus indicating that on the proposed comprehensive system a 7-mile journey can be made in the time now required by a 4-mile trip. All of the time zones will be greatly widened by the adoption of this comprehensive plan. For instance, the twenty-thirty-minute zone shown for the unified system is approximately double the area of the twenty-thirty-minute zone shown for the rapid transit and surface lines separately.

CAPACITY WILL BE INCREASED

The outbound loading in October, 1922, from the central business district in the maximum hour of the evening rush was 80,101 passengers in 1,048 cars on the surface lines and 80,087 riders in 1,109 cars on the elevated lines, a total of 160,188 passengers. At the end of the first period of construction, subway and elevated lines will have a joint capacity of nearly 400,000, or more than double the total number now carried by the surface and elevated lines. The car flow chart shows the vastly increased capacity of the rapid transit lines of the unified transportation system at the end of the first period of construction, as compared with the capacity of the existing elevated system.

The maximum number of cars that can be operated now on either elevated or surface routes, which terminate in or pass through the central business district, is determined by throats or controlling points in this district. As the present outlets from this congested district are used nearly to their practical limit, the elimination of such controlling points will result in greatly increased capacity throughout the length of such routes.

The operation of the unified transportation system will reduce the number of street cars now required to serve the central business district. No curtailment in this street car service should be made until the rapid transit lines have been equipped to carry the load. The handling of all long-haul passengers on properly designed rapid transit lines will reduce the need for surface cars, and eliminate them to a large extent from the central business district. In the opinion of the engineer adequate transportation will be the most potent factor in causing the central business district to expand to the north, west and south. The unified trans-



Car Flow Diagram of the Rapid Transit Lines at the End of the First Period of Construction and in 1922 portation system is designed to serve a delivery district of nearly three square miles.

OPERATING EXPENSES WILL BE REDUCED

The average length of ride on the surface lines at the present is over 4.2 miles, which is the longest average ride provided by any street car service in the world. Under the proposed unified system, with transfers, practically all of the long haul traffic will be diverted to the elevated and subway lines, thereby reducing materially the average length of ride on the street car lines. As the operating cost per car mile on rapid transit lines is only 75 per cent of the operating cost per car-mile on surface lines, it follows that the cost per passenger trip will be less than at present.

DESIGN AND CONSTRUCTION

The engineer points out that he has not made detailed estimates, but that the essential elements of design are outlined in such a manner as to indicate the various types of construction, upon which the estimates of cost are based. The general design of all the subway lines is similar, structural steel frames on 5-ft. centers forming the skeleton of the subway structure. The side walls and roof are concrete, and all beams and columns are incased in concrete. A concrete partition wall separates adjacent bores except at stations. The floor is of reinforced concrete designed to withstand hydrostatic pressure. The bores of all subways are designed to permit the use of the tunnels by either rapid transit trains or street cars.

Where the subways dip to pass beneath the Chicago River they will reach their greatest depth, and the subaqueous construction problems involved are difficult. However, these problems will be no more complicated than were those in the construction of the river tunnels in La Salle Street and Washington Street. In the opinion of the engineer, no undue or extra-hazardous conditions are likely to arise in river crossing construction. The grade of the under-crossings at the Chicago River is determined by the depth of channel required by the United States Government. A maximum gradient of 3 per cent is recommended for the approaches.

For the purposes of ventilation, partition walls will be placed between adjacent tracks in order that the movement of trains will push the air ahead and out through openings, and at the same time draw in a supply of fresh air. In addition to the ventilation caused by train movement, supplementary ventilating devices will be installed. It may also be advisable to make a connection from the subways to adjacent buildings for additional ventilation.

TYPE OF ELEVATED RAILROAD RECOMMENDED

After a review of the existing types of construction in different cities, the construction of solid-floor steel structures is recommended in the public streets and that where two lines of columns are used they be placed on the side walks. In view of the economy of the open-deck structure it should be used on all private rights-of-way. The cost estimates do not provide for the construction of solid-floor structures.

The rapid transit cars will be of all steel construction of modern design. Side doors will be located in the center of the car and at the quarter points. End doors will also be provided to permit the circulation of passengers between cars in the train. The side doors will be mechanically operated and electrically controlled so as to facilitate loading and prevent undue delay at stations.

The use of protected third rails is recommended for power distribution throughout the system. Automatic block signals and interlocking plants will be installed to insure safety of operation, and to assist in the efficient spacing and dispatching of trains. All switches under control of interlocking plants will be operated by electro-pneumatic mechanism of approved design.

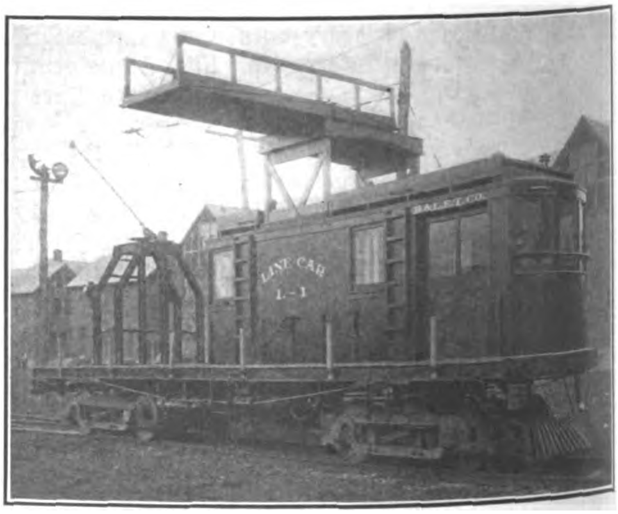
The estimates of costs for surface lines are based on the continued use of the type of standard track construction used in Chicago since 1907, consisting of 9-in. girder rails supported by treated wood ties laid upon either a 6-in. concrete foundation or an 8-in. rolled stone foundation. The joints are welded and the 16-ft. right-of-way is paved with granite blocks laid on a concrete base and grouted. The paving cost is about 30 per cent of the cost of the entire track construction. Attention is also called to the monolithic track construction now used in Detroit. It is stated that if found suitable for Chicago it should be adopted, as its use would reduce the estimate by more than six million dollars.

◆

Reel Rack on Rear of Line Car

ON A LINE CAR recently built in the shops of the Buffalo & Lake Erie Traction Company the frame supporting the trolley base and pole is used also as a rack for reels of wire. The framework is a double inverted U, made of 6-in. channels and supported by additional vertical members, as shown in the accompanying illustration. A 3-in. axle for carrying two reels of trolley wire rests on this framework.

The car is of sturdy construction throughout, with an over-all length of 42.5 ft. and a width of 8 ft. 8 in. The underframe is of 8-in. I-beams. Standard trucks with steel wheels, four GE-204 motors and K-34 control are used. The height of the car with tower down is 12 ft. 6 in. The mechanism for raising the tower is ordinarily operated by air, although there is a hand mechanism for emergency. A vertical lift of 6 ft. 6 in. is possible, making the maximum height about 19 ft.



Framework of Channel Iron Supports Two Reels of Wire

P. J. Wood, master mechanic, designed and built the car at the company's own shops. The total cost was less than $5,900, including labor, and the material used was charged for as second hand at current market prices.

An Analysis of Special Trackwork Loads

The Effect of Impact Is the Most Serious Factor and the Analysis Shows the Location of the Points Where This Is Greatest—Special Examples Show Where Excessive Wear and Impact Take Place

By M. Bernard
New York, N. Y.

THERE have appeared in the ELECTRIC RAILWAY JOURNAL from time to time articles describing some deviation from the accepted standards of special trackwork construction. These can be divided into two general groups: One in which the purpose is to lessen the wear and pounding on special work by providing flange bearing of the wheel on the rail, and the other by the use of metal of different composition from the manganese steel so familiar to electric railway engineers. In the former, flange bearing is provided throughout the limits of the special work to decrease to a minimum the shock at the intersections of the flangeways. In the latter, the shock resisting qualities of the special work are increased by the use of alloy steel, such as chrome nickel or other alloys.

Although various methods for embodying the above have been proposed at various times, yet fundamental principles descriptive of the various influence lines of the loads involved, such as are so common in any study of steel structures, have not been given. As is well known, it is the general practice to use the same design of frogs without regard to their particular location in a special-work layout. This is rather arbitrary if we consider that no other engineering structure is designed without regard to the various effects of the different loads.

In order to determine whether the present practice of special-work design conforms to the particular requirement imposed by different loads and shocks, the accompanying diagram has been made to show how loads are received and transmitted at intersection points. A double-track crossing with the tracks lettered *A, B, C* and *D* is shown. The direction of traffic is denoted by arrows. Where wear alone results by the cars on the respective tracks, the corresponding wearing points are given capital letters corresponding to the track over which the cars operate (*A, B, C, D*). Where impact results the capital letters are shown with an affix *I* (*AI, BI, CI, DI*). In order to group the frogs with the same relative effects, small letters, *a, b, c* and *d*, are used. Frogs with the same letter receive the same wear and impact, and each small letter represents a group of four frogs.

Let us analyze this diagram for three different volumes of traffic, namely: (1) where the traffic on tracks *A* and *B* is practically the same as on tracks *C* and *D;* (2) where the traffic on tracks *A* and *B* is greater than on tracks *C* and *D* and (3) where the traffic on tracks *A* and *B* is less than on tracks *C* and *D*.

To give a concrete example let us ascribe to (1) an annual traffic of 150,000 car passes, to condition (2) an annual traffic of 200,000 car passes for each of tracks *A* and *B* and of 100,000 car passes for each of tracks *C* and *D*, and under conditions (3) an annual traffic of 100,000 car passes for each of tracks *A* and *B* and 200,000 car passes for each of tracks *C* and *D*.

The resultant load action is shown in the accompanying table: This gives figures for traffic over crossing of tracks *A* and *D* only. Corresponding values are the same for the other three crossings.

A comparison of these shows the following:

Frog *a* under any of the three conditions is subjected to practically double the loading effect of any other frog and naturally this frog fails prematurely as compared to the rest of the layout. It would seem that it is not quite logical arbitrarily to specify a comparatively costly alloy steel for a whole crossing if only a small proportion of it requires this material.

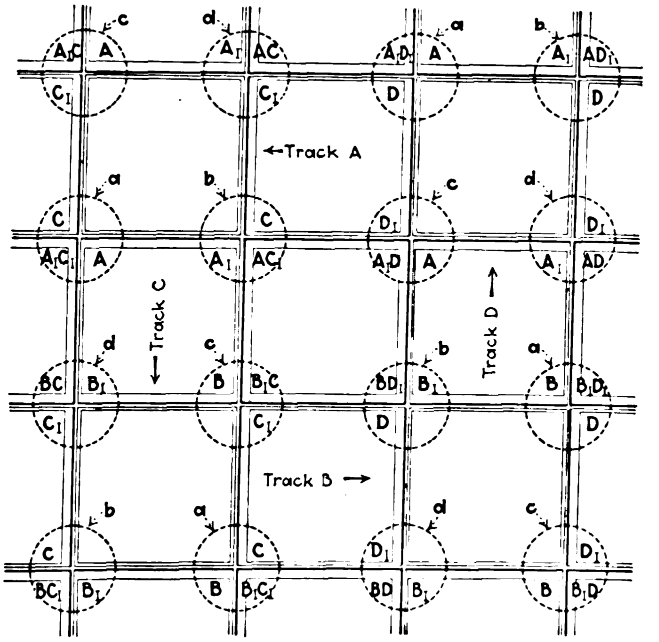
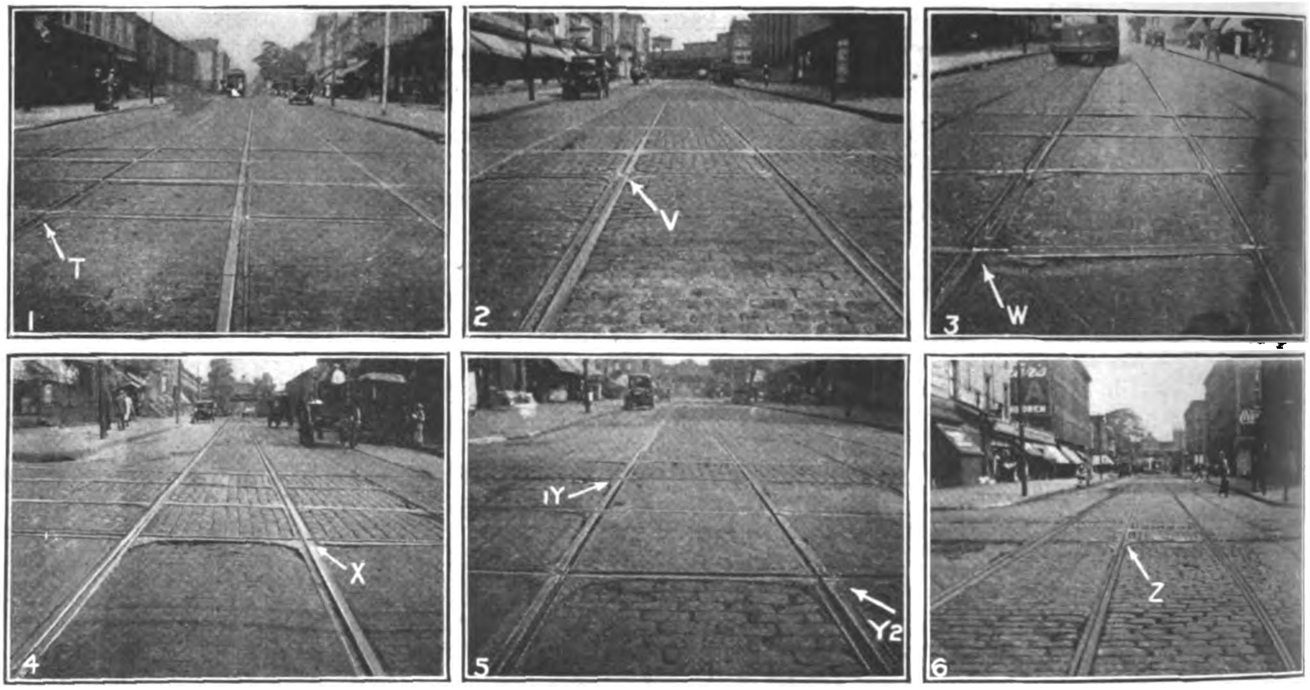


Diagram of Loads and Impact Received and Transmitted on Double-Track Crossings

LOAD ACTION, WEAR AND IMPACT, FOR DOUBLE TRACK CROSSING

Group	a			b			c			d		
Frogs Tracks *A* and *D*	*A*	*AI, DI*	*D*	*D*	*A, DI*	*AI*	*DI*	*AI, D*	*A*	*AI*	*A, D*	*DI*
Wear Case 1	150,000		150,000	150,000	150,000			150,000	150,000		300,000	
Impact Case 1		300,000			150,000	150,000	150,000	150,000		150,000		150,000
Wear Case 2	200,000		100,000	100,000	200,000			100,000	200,000		300,000	
Impact Case 2		300,000			100,000	200,000	100,000	200,000		200,000		100,000
Wear Case 3	100,000		200,000	200,000	100,000			200,000	100,000		300,000	
Impact Case 3		300,000			200,000	100,000	200,000	100,000		100,000		200,000

It will be noted also from the table that joints should not be located arbitrarily but the distribution of the loads should be considered. The practice of locating joints on the track with the least traffic is not always correct. If possible it would seem to be more logical



Some Crossing Frogs Wear Out While Others Remain in Good Condition

to pair frogs as much as possible according to their carrying like or similar loads.

At the points where wear alone results, the presence of steel harder than the abutting rail results generally in a pounding at the edge of the center. Instances can be cited where unbroken main-line hard-center frogs failed as a result of the pounding caused by unequal wearing qualities of the abutting pieces.

A study of the table also shows that indiscriminate use of arc welding is not justified. In many cases grinding the points of frogs to a uniform level gives better results. An analysis of the diagram seems to show the reason. It will be noted that due to double impact the points *A1*, *D1* must in time be pounded to a lower level than *A* and *D* which further increases the pounding effect of the wheels on *A1*, *D1*. Under most conditions the grinding to a uniform level will give better results than building up *A1*, *D1* with the arc welder. The reason for this is that the metal added by welding will not withstand pounding as well as the original metal would. Grinding of the welded portion to a uniform level is seldom obtained. Special work as a general rule is hardly ever renewed due to breaking down of the component parts between the frog points whether the construction be built up, hard center or solid.

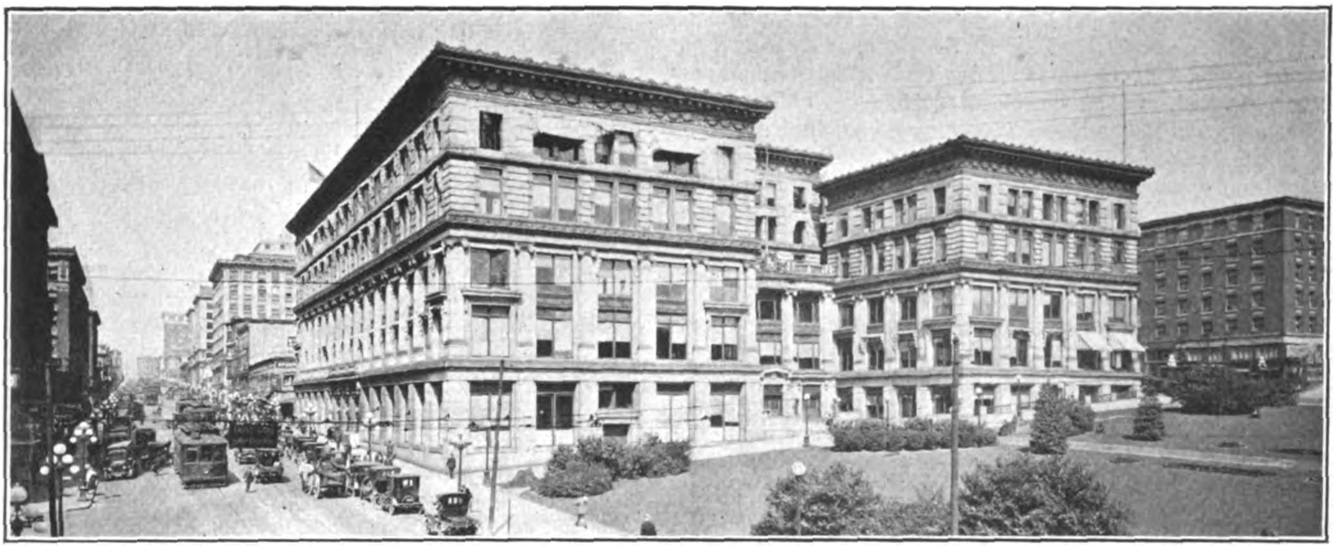
From a study of the diagram the weakest points for any given service are easily determined, and the design should be made with due consideration to them. Thus in the examples taken frog *a* is the weakest point. Only about 6 per cent of the points of contact at intersections receive a greater wheel load action than normal. The conclusion, therefore, is that it is hardly justified economically to make the rest of the crossing the same as is required for this 6 per cent. A suggested design is one in which this 6 per cent can be renewed as required until such times as the limit of life is reached in the rest of the crossing. At present when special work is renewed the pieces other than the intersection points are comparatively little worn except, of course, curved special work with sharp radii.

The fact that certain frogs of a crossing wear out while others remain in good condition is further illustrated in the six half-tones shown. In No. 1 the frog at *T* is badly pounded while other parts are in good condition. It will be noted that *T* corresponds to *a* in the accompanying analysis. In illustration No. 2 the frog *V* begins to show effects of pounding, in No. 3 the frog *W* needs repairs, in No. 4 the frog *X* is showing effects of hard service, in No. 5 both *Y1* and *Y2* require attention, and in No. 6 it is *Z* that shows excessive wear. In all cases the frogs corresponding to *a* in the analysis show excessive wear.

Boston Elevated Spent $17,000,000 on Plant Improvements

THE recent report of the trustees of the Boston Elevated Railway shows that approximately $17,000,000 was spent upon road and equipment, either for entirely new property or for the replacement of worn-out property during the period from July 1, 1918, to Dec. 31, 1922. The following sources supplied this amount for the improvement: $2,000,000, part of proceeds of preferred stock to which the stockholders were compelled to subscribe before the public control act could take effect; $4,787,000, part of the proceeds from the sale of the Cambridge Subway, which has already been appropriated for additions and improvements; $9,018,000, available from the depreciation charge taken out of the cost of service July 1, 1918, to Dec. 31, 1922; $700,000, approximate amount received from insurance and from the sale of real estate properties; $1,800,000, floating debt as of Dec. 31, 1922, which later was to be covered by a bond issue. These sources total $18,305,000.

A total of $17,146,119 has been expended to provide facilities necessary for efficient and economical operation. These facilities include: Cars, $8,404,924; carhouses and shops, $1,836,282; power houses and transmission of electricity, $2,679,264; surface lines, $3,041,625; elevated structures and appurtenances, $871,840; miscellaneous improvements, $312,184.



The County-City Building Which Houses the Offices of Seattle's Street Railway Department and Other Municipal Activities

Four Years of Municipal Railway Ownership in Seattle

By P. M. Fogg

Formerly Secretary Seattle Civil Service Commission

The Lines Were Acquired Because of War Conditions—After an Operating Deficit in 1919 Fares Were Raised to 10 Cents in July, 1920—A New Mayor Reduced Them to 5 Cents on March 1, 1923, but the City Council, Overriding the Mayor's Veto, Compelled a Return to 10 Cents Cash Fare

THE city of Seattle has now experienced a trifle more than four years as owner of an extensive street railway system. Three mayors have successively occupied the chief executive's chair during this period, and changes of policy have been numerous. Twice have rates of fare been raised, only to be lowered, and again increased. Legislation covering this latest change fixed July 5 as the effective date. Traffic, on the other hand, has materially decreased in volume since the system was acquired, and politics has played a vigorous part in the colorful drama of the transportation lines. The history of this case is one of peculiar interest, as it becomes increasingly evident that the city, having found no solution for its pressing railway problems, is in fact completely puzzled to know what to do with the property which it finds on its hands.

The lines were acquired as a result of the acute conditions brought about by the war. Shipbuilders were operating under full pressure from the war bureaus, and the car service rendered by the Puget Sound Traction, Light & Power Company was grossly inadequate, especially on lines feeding to those yards. Repeated requests by the city authorities for improvement did not bring results satisfactory to the government's local representatives, who were operating free steam trains for the shipyard workers.

Negotiations for the purchase of the electric railways by the city were thereupon opened on Sept. 5, 1918, and an agreement having speedily been reached, the matter was favorably decided by a vote of the people two months later; the ratio being three and a half to one. According to the terms of the contract then, the entire property, including about 195 miles of track, together with rolling stock, carhouses, shops and real estate, passed into possession of the city of Seattle on April 1, 1919. The city issued and tendered in payment $15,000,000 in 5 per cent utility bonds, to be retired in eighteen equal annual installments, beginning March 1, 1922. The contract further stipulated in this connection that a rate of fare must be maintained at all times, high enough to provide sufficient revenue for the payment of both principal and interest.

The superintendent of public utilities immediately took control and proceeded to effect certain economies and improvements in the service. With a few exceptions, all of the employees of the traction company, approximately 2,000 in number, were transferred in a body to the payroll of the municipality, arrangements having been made by the Civil Service Commission to this effect. Two lines, totaling 23 miles in length, which the city had previously owned and operated for five years at an average annual loss of $35,000, were consolidated with the system. Free rides for police and firemen were abolished, and as the ending of the war had fortunately eliminated the problem of abnormal service to the shipyards, it appeared that an opportunity for municipal ownership to assert itself had arrived.

At this time, a 5-cent fare was still in force, it having been established in 1917. But during the first eight months of operation only 92,061,302 passengers were carried, and at the close of 1919 the railway department showed a loss, including bond interest and depreciation, of $517,173. The wage increase, granted to all city employees in October, 1919, automatically included the trainmen, and this of course added to the cost of operation.

In the spring of 1920, a newly-elected mayor replaced the former superintendent of public utilities with an appointee of his own choice, and it soon became evident that the rate of car fare would be raised, in an effort to improve the system's financial condition. The 10-cent cash fare, with four tokens for 25 cents, and free transfers, became effective in July. There was considerable plain talk from the chief executive who intimated that Seattle had bought its lines at an exorbitant figure, under terms of a contract impossible of fulfillment, and experts were called into consultation, but without resulting action. The difficulties were not overcome by the increased fare, for the year 1920 closed with a net loss of $986,327, and an unsatisfactory record of public patronage of the lines.

Employees Were Paid by "Warrants"

Apparently convinced that a larger dose of the "fare raising remedy" was required, the City Council again increased rates in January, 1921. Tokens were thereafter sold at three for a quarter, with the cash fare remaining as before, and transfers free. In March, the first installment of interest on the $15,000,000 bond issue became due, and for the first time the railway department, finding itself unable to finance its payrolls, hoisted the signal of distress. "Warrants" unsupported by funds were therefore issued to the employees, accepted by local banks, and later redeemed by the treasurer when monies became available; a device which has been resorted to on several subsequent occasions.

Jitneys were legislated off the streets in September, 1921, as a measure of protection, but regardless of this and of the unprofitable operation of two lines of auto buses as feeders, the number of passengers carried during the year decreased by more than 20 per cent from the record for 1920. Nevertheless the high fare, together with greater economy in operation had created a margin of profit in 1921 amounting to $363,952.

SEATTLE MUNICIPAL STREET RAILWAY SYSTEM
OPERATION AND MAINTENANCE

	1919*	1920	1921	1922
Ways and structures	$282,992	$455,864	$427,964	$382,805
Equipment	528,507	734,017	579,305	569,563
Power	558,528	683,934	659,748	613,677
Conducting transportation	1,950,460	2,644,291	2,435,899	2,040,453
Traffic, general and miscellaneous	247,377	365,820	300,995	339,895
Depreciation	499,173	677,179	680,629	685,114
Loss on auto bus lines	904	10,738	14,873	(b)
Bond interest and discount (a)	687,424	865,660	866,847	835,533
Total revenues	4,158,153	5,451,175	6,347,175	6,228,130
Net loss (c)	517,173	986,327	....	....
Net profit (c)	....	....	363,952	710,084
Car-miles operated	....	....	15,260,399	15,205,297
Number of passengers	....	122,866,577	97,519,213	96,406,775
Miles of electric track operated	....	....	....	226.75
Miles of cable track operated	....	....	....	8.32
Number of cars in operating condition	....	....	....	595
Wages of common labor	....	....	....	(d)$4.50 to $5.00
Wages of trainmen	....	(d) $4.75 to 5.25	....	(e)$135 to $155

* For 1919, the data includes nine months for the purchased lines, and twelve months in the case of lines previously operated by the city.

(a) Does not include amortization of principal on funded debt.

(b) In 1922 there was also a loss on the bus lines but the bus accounts were not segregated.

(c) For an explanation of these sums, see text.

(d) per day; (e) per month.

In the spring of 1922, the voters decisively defeated a proposition which would have thrown the general tax fund of the city wide open for the use of the railway department. The present Mayor, Dr. E. J. Brown, was elected on a 5-cent fare issue, and in June, 1922, promised the citizens that this boon would be theirs "within ninety days." Just how he planned to bring about a sound and speedy readjustment of the railway's finances in order to render this measure practicable was left largely to the imagination. He proceeded, however, to install his new superintendent of public utilities, and the situation became more prominent than ever. It had been aggravated by reason of the fact that on March 1, 1922, the first installment of the principal of the purchase bonds, $833,000, became due and was paid, together with the outstanding interest; an accomplishment attended with considerable embarrassment.

Court decisions resulting from a suit brought by a group of taxpayers now revealed the legal inability of the city to use its general tax fund for the assistance of the transportation lines. This finding was a disap-

GIRLS BREAD
ENTRANCE ON CORNER
LIBERTY THEATRE
23
7
530
370

First Avenue, Seattle, Is in the Older Business Section of the City. Forty per Cent of the Electric Lines Are Routed Past This Corner pointment to those who had hoped that the taxpayers, as owners of the system, could be levied on in support of its unstable foundation.

Numerous delays occurred before the fulfillment of the Mayor's campaign promise for a lower fare, but on March 1, 1923, the 5-cent rate became an accomplished fact. A token, sold at the rate of four for 25 cents (or seven cents in cash), carried full transfer privileges. Seattle held its breath and watched for the results of the plunge. Nor had it long to wait before they became manifest. In 1922, the books had shown a profit of $710,084, but this provided for no bond redemption fund. Thus the financial status was by no means a cause for undue jubilation as yet.

Daily losses of from $4,000 to $5,000 were at once encountered during March, although patronage showed a slight increase over the record for the corresponding month of 1922. The net loss for the month was $138,725; a result which created a state of consternation in the City Council.

April brought talk of a return to the previous schedule of fares, it having become apparent that the 5-cent rate would not even meet the requirements for operation and maintenance. This move was opposed by Mayor Brown, who apparently unperturbed, remarked, "I gave the people a 5-cent fare, but if they would rather ride in automobiles than patronize their street cars, I can't help it."

TEN-CENT CASH FARE RESTORED

As pointing the way toward possible relief, negotiations have been opened with the bondholders, looking toward a rewriting of the purchase contract and an extension of the time for redemption of the securities. These overtures are still in their initial stage, but in order to check the losses resulting from the fare reduction, the Council passed an ordinance on May 14, providing for a return of the cash fare to its previous status of 10 cents, with tokens at three for a quarter, and transfers free. This was in line with an opinion submitted by the superintendent of public utilities, who saw only disaster in the continuance of the low fare. The Mayor vetoed the ordinance. But the Council on June 4 repassed it over the veto, and the restored rates in consequence became effective on June 16. The trainmen and shopmen have recently filed a formal request for a substantial increase in pay for 1924, which, if granted, will add considerably to the operation costs.

Should the riding public be expected to provide a profit sufficient to pay for its street railways in eighteen years? Or is it the function of a municipally owned transportation system to furnish service at cost, leaving the financing of the purchase to be met by the taxpayers as a whole? Both theories have ardent supporters, regardless of the court decisions, and the end of the struggle cannot be foretold.

Meantime, the management is capably endeavoring to provide reasonable service. An increased use of small one-man cars has effected a considerable saving during the past few years, and many cars of the older type have been converted, and are in use successfully. All cars are provided with safety gates or doors. At present, power for operation of the street railways is purchased from the Puget Sound Power & Light Company, but upon completion of the Skagit River hydroelectric development, now under construction by the city, energy will be furnished from there for this and other purposes.

George F. Russell, superintendent of public utilities, exercises supervision over the activities of the municipal railway system, and D. W. Henderson is the railway superintendent in immediate charge.

Popularize the Industry

By E. C. SPRING

General Superintendent Lehigh Valley Transit Company

IN REVIEWING the many thoughts and suggestions for getting new business, such as merchandising transportation and other similar schemes that have been presented from time to time, it appears that they can all be crystallized into the single word "popularize." It is a fact that the progress made in creating new railway business has not been satisfactory, many companies showing but slight increases in revenue over a year ago. With the increasing number of other attractive modes of transportation the electric railway is confronted with a problem of no small proportions, but which can be met by intelligent, up-to-date action.

We cannot become inactive and expect the business to come to us. We must go after the business, and like the Jew salesman, find the customer that buys for cash. Let us popularize our individual properties.

Webster, in his definition of the word "popular," gives us the key to possible success. He defines popular as "pertaining to, suitable for, or pleasing to the common people." The combination of these points gives us a solid foundation upon which to build. Our industry from its beginning has been primarily for the common people. So far as "pertaining to the common people" is concerned, the electric railway is popular.

But is the service that we are rendering to the common people suitable and pleasing? This is a question which every manager must ask himself. Is your company and its service popular in its community? Are you personally popular? Are your employees popular? These questions must be answered, and if they cannot be answered in the affirmative something is wrong.

Any commercial article that is a big seller has been made popular in some way by the producer. Any successful man or woman carries with him, or her, a certain degree of popularity. The success of a large corporation is based upon its popularity with the masses. We can go down the line with successes of all kinds and we will find invariably that success and popularity go hand in hand.

How to go about popularizing his own property is a question for the individual manager to work out. The reason that we are not receiving the revenues which belong to us by our vested rights is that other means of transportation are more popular than ours. We must get busy and offset their progress or submit to heavy losses.

One thought that we must not lose sight of, however, is that any mode of transportation teaches the public to ride, and we can benefit by the other fellow's advertising. When the electric railway came into the transportation field it was the cry that the steam railroads were doomed. The electric railways, however, not only demonstrated that they had their own field for operation, but also that they were immense feeders for the steam roads. Instead of losing revenue, the receipts of the latter increased materially. They had the advantage of the advertising done by the electric railways. The same thing, I believe, will hold true in a measure today. Our industry cannot but be benefited by the other transportation activities.

Mid-Western Railway Executives Suggest Ways to Stimulate Summer Riding

PICNICS, parks and publicity are the most promising methods of building up passenger traffic during the summer months, according to the opinion of a number of mid-Western electric railway executives. A diplomatic campaign against the private automobile may accomplish something in this direction, according to some, and others think that the only satisfactory way to make the railway service more popular is to improve its quality.

In the advertising of the Des Moines City Railway, the picnic idea plays an important part. The company calls the attention of its riders to the various places of amusement and interest which can be reached by its lines, suggesting from time to time the advantages of being carried on clean, cool, comfortable street cars to the various parks and picnic grounds rather than having to bother with automobiles and parking troubles. In this connection the difference in cost between riding on the street railway and using private automobiles is emphasized. It is felt, according to E. L. Marriage, assistant to the president, that real progress is being made by this method.

In St. Louis the United Railways makes it a practice to call attention to special amusements by the use of light box signs. No special emphasis is placed upon such activities by B. W. Frauenthal, general traffic agent, because it is thought that most people visiting the various amusement resorts in and near St. Louis ride on the street cars anyway. Display signs calling attention to the zoo, the botanical gardens, horse shows, and exhibitions at the art museum, have been used with some success. The company makes it a rule to advertise only such events as are free to the public.

The Hutchinson Interurban Railway has tried many ways to increase its passenger revenue, but according to J. E. Humbert, general manager, the schooling of the trainmen has borne more fruit than any other scheme. The company is building an attractive picnic park at Carey Lake, but no great increase in riding is expected to result from this. The best way to stimulate traffic, according to Mr. Humbert, is to provide a service which will really attract the people. He believes that the practice of waiting for passengers who are a trifle late to catch a car is worth while on lines with long headways. Near the end of the route, the trainmen make it a practice in inclement weather to pick up inbound passengers on the outbound trip and carry them free to the end of the line, rather than keep these people standing until the car reaches the end of the line and returns.

In Topeka the railway keeps in close touch with various clubs, lodges, Sunday schools, etc., with a view to promoting summer trolley picnics. Field days, outings, band concerts and other open-air attractions are promoted by the railway. These plans have been quite successful, according to A. M. Patten, assistant general manager. At the same time the company calls the attention of motorists to the damage done to tires and exterior finish of automobiles by allowing the machines to stand on hot summer days for a long time in the open. Mention is made also of the fact that the frequent rain showers are a source of expense to motorists by necessitating frequent washing of cars and lubrication of squeaky springs.

Good service is emphasized by R. V. Miller, general manager the Oklahoma Union Railway, as the most effective means of increasing summer riding. It is important to have the cars clean and well ventilated. Passengers like to ride the cars in the summer time when they can get plenty of air. If possible there should be some way of raising the front windows or opening the front door of the car so that there will be plenty of ventilation. The side windows by themselves are hardly sufficient for proper ventilation, according to Mr. Miller.

Originality Marks Publicity of East St. Louis & Suburban Railway

A RATHER remarkable series of advertisements was published in the *East St. Louis Daily Journal* during the year 1922 by the local railway company. The keynote of this publicity campaign may be judged from one of the earlier advertisements in which the company says "In the final analysis men are judged by what they do, rather than by their intentions, but we want you to know what our intentions are, so that if you agree with our policy we may all co-operate for mutual benefit to secure the best results."

Courtesy toward the public is one of the chief points which the company sought to advertise during this campaign. "We have not all of us always been courteous, but we know we particularly desire to be courteous and believe that we have succeeded more than fairly well," is a statement made.

Safety is another point upon which emphasis was placed. The company showed that the number of street car accidents decreased 27 per cent in 1921, compared with 1920. It showed also that there was a reduction in the number of accidents in which automobiles were involved from 237 in 1920 to 220 in 1921. At the same time accidents of all kinds were reduced from 661 to 471, or approximately 35 per cent.

The railway declares its intention, first, to provide a seat in the non-rush hours for every car rider who travels any appreciable distance, and second, in the rush hour to provide sufficient capacity so that the number of standees shall be no larger than the number of passengers seated.

An amusing method of determining the relative cleanliness of different cars was tried by the railway, and this provided copy for several advertisements. One of the good housewives of East St. Louis was asked by the company to ride all the cars she could during several days, and at the end of that time to report to the president of the company the five cars on which the greatest effort toward cleanliness had been made by the motorman or conductor. The company boasts that there were so many clean cars that it was almost impossible for her to decide upon the five cleanest. However, nine operators received special commendation from W. H. Sawyer, president of the company, for their good work in this direction. An unusual feature of the commendation and one that appealed particularly to the platform men was the fact that it was accompanied in each case by a $5 bill.

In another advertisement the public was asked to report to the company any habitual overloading. The financial end was touched upon in statements to the effect that the public is entitled to good service and the company is entitled to a fair return. The outstanding feature of all of these advertisements was a spirit of genuine sincerity and friendliness to the public.

Two Southern Cities to Have Entirely New Rolling Stock

To Demonstrate the Belief that Modern Cars Will Bring Paying Traffic, Old-Type Cars Are Being Replaced with Forty New Double-Truck Cars in Huntington, W. Va., and with Twenty-seven New Single-Truck Cars in Lexington, Ky.

By "Spectator"

This Substation at Huntington Is Typical of the New Construction by the Local Utility Company

IT WAS a great satisfaction for me, on a recent visit to note the unmistakable signs of prosperity in Huntington, W. Va., and Lexington, Ky. In this prosperity the railways in these thriving cities are having their share.

Huntington is making rapid strides as a manufacturing center. The industries are of such character as to require large amounts of power as compared with the number of workers involved. Hence the Consolidated Power & Light Company, of which the Ohio Valley Electric Railway forms a part, is being called upon to furnish increased power without commensurate increases in railway business. The local utility system is one of the most profitable subsidiaries of the Consolidated Electric Power Company (formerly the American Railway), and until recently it held the record for low operating ratio, but has now been passed by the Altoona property. Its railway business is about one-fifth of the total, or say $700,000 out of $3,500,000.

The electric railway mileage in Huntington is small for the area of the city and the population. In the opinion of W. R. Power, general manager of the local property, this mileage is not likely to be increased greatly in the near future, unless such increases are financed by the communities benefited. The transportation problem in the city is rather unique, due to the way in which the city was laid out and to its natural topographical characteristics. The city was founded about fifty years ago by Collis P. Huntington, the steam railroad magnate, and his colleagues. The site was selected with great care and the city plan was developed in the light of the best engineering knowledge of the time. While the founders apparently did not visualize a city as large as the present one, provisions were made for almost unlimited growth. This growth, however, must be largely in a longitudinal direction because the city stretches along the Ohio River between it and a range of hills too steep for general residence purposes. The plan provided for wide longitudinal avenues, and reasonably wide cross streets with extra wide ones at intervals. Where the original plan has been adhered to the results have been excellent. The city now has a length of about 10 miles and a width of from 1 to 2 miles.

From the electric railway standpoint it is evident that with this long narrow form of the city, the transportation requirements are largely parallel with the river, and few lines are needed to cover the city sufficiently. Crosstown traffic is obviously of relatively little importance.

Another important factor is this: Huntington is a young city, comparatively, and its greatest growth has been in recent years. During the boom days of the electric railway, say from 1890 to 1905, the city needed little mileage and promoters of the day did not see much chance for profit in extending the lines out into the country. When the active growth began it was too late, the electric railways of the country having settled down to intensive development of what they had, rather than further extension.

The local situation has also been strongly affected by the automobile. The wide streets, beautiful surroundings and industrial prosperity have combined to induce large use of this vehicle. I was told that there were at least 7,000 machines in the city, with the number increasing rapidly. Based on a recent school census, and allowing four and one-half inhabitants per school pupil, the population of the city is now about 75,000. Hence there is nearly one automobile for each two families of five persons each. Not only do the Huntingtonians have automobiles, but they use them, because the streets afford liberal parking space.

With conditions so favorable for automobile competition the railway has been hard put to furnish profitable service. From the standpoint of profit it has been fortunate that the electric railway mileage was not more than it is. The company has realized, however, that something must be done to improve the service radically and has arranged with the parent company for an entirely new outfit of city cars, numbering forty. Mr. Power had hoped to secure fifty, but it was decided that ten of the old-type cars could well be retained to serve as "extras." The new cars are light, double-truck cars, arranged for either one-man or two-man operation. Their weight is about 23,000 lb. and they are provided with all of the comforts and conveniences of the modern-type car designed to attract patronage. They are being constructed at the Brill works.

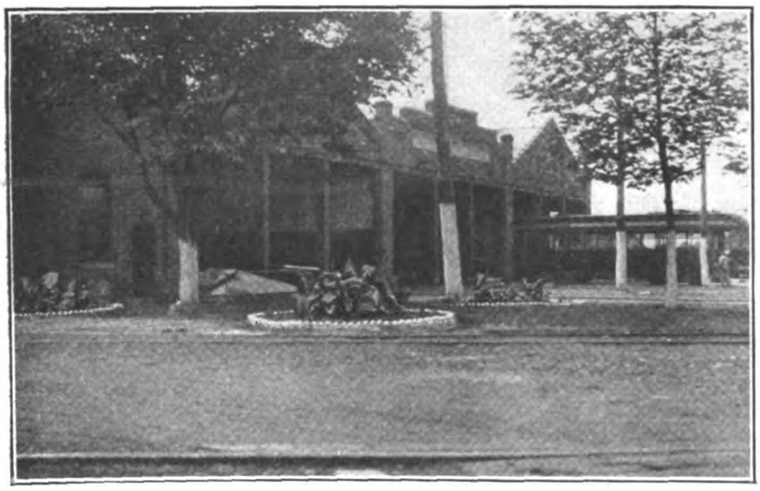
The parent company is giving the Huntington management an opportunity to demonstrate what can be done by giving the public the best service that modern practice affords. The matter has, therefore, more than local significance.

The Consolidated Power & Light Company is doing more than furnishing Huntington with new cars and improved railway service. It is spending $1,000,000 on its power plant at Kenova, near by. Further expenditure is anticipated when the present improvements are completed. The power plant is being enlarged to meet the unprecedented demand for power service. The increased capacity is being absorbed as rapidly as provided. One new customer this year will furnish $500,000 worth of business per annum. The present power plant is the result of gradual evolution and hence contains assorted equipment. Part of the improvement will be gradually to modernize the station. The present work will constitute a long step in that direction. Substation design and construction are also receiving attention.

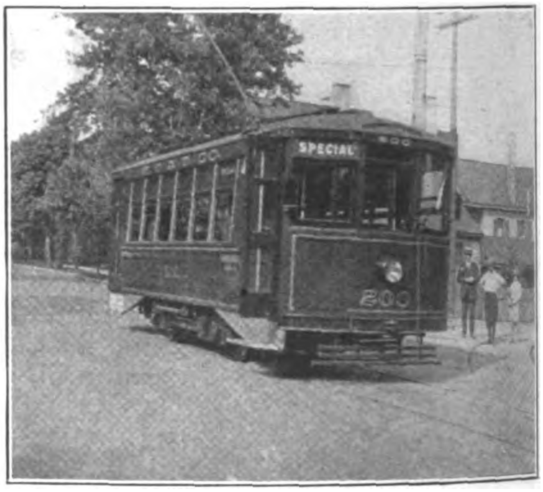
An integral part of the Huntington property is the railway and power utility in the nearby city of Ashland, Ky. The two cities are connected by an interurban line belonging to the company and crossing the Big Sandy River. Ashland has many of the characteristics of Huntington, with broad streets and attractive surroundings. It is also an industrial center, having a population about one-fifth that of Huntington.

Lexington Will Have New Cars Also

Lexington, Ky., is a city about two-thirds the size of Huntington. The two cities are comparable as far as size and character of population are concerned, but they present many contrasts in other respects. They have this in common, however, that they are both being re-outfitted with new cars of advanced design.



Flower Beds Are Not Considered Inconsistent with Good Maintenance at the Huntington Shops



A Snapshot of One of the New City Cars Taken Near the Paris Interurban Terminal

There is practically no manufacturing in Lexington, its prosperity coming from the fact that it is the center of a rich farming country. It is surrounded with small thriving cities between which and Lexington the local railway, operated by the Kentucky Traction & Terminal Company, furnishes admirable interurban service.

The transportation situation in Lexington must be considered in connection with the interurban business. The local traffic is not dense enough to support service with large two-man cars, and some years ago the company remodeled a number of single-truck cars and put them into service under one-man operation. They were recognized as a makeshift, pending the time when modern types of cars could be afforded. This time has now arrived, and, encouraged by its success with more than a year of one-man operation of its light interurban cars, the company is discarding all of the present city cars, replacing them with new safety cars.

The new cars are being built by the Cincinnati Car Company and equipped with the safety apparatus devised by John Sutherland of Davenport, Iowa. Every practicable feature has been incorporated to render the service attractive. For example, the seats are furnished with plush-covered spring cushions and backs; the seats are spaced so as to give liberal knee room, which is further increased by the recessing of the rear of the seat backs; stanchions are provided at convenient points for the convenience of standing passengers, and the body is trimmed and painted to give a pleasing effect. A unique feature of the car is that it is operated front-entrance, rear-exit. There is no turnstile or other device at the rear to prevent passengers from boarding, but trouble from fraud in this direction is not anticipated. The city has a predominately native population, and experience with over-riding on the interurban lines indicates that little loss is to be expected on the new city cars from dishonesty. The motorman has separate control of the rear door and is provided with outside and inside mirrors so that he can readily supervise the use of the rear door for exit purposes.

The general manager of the company, J. P. Pope, is confident that many of the elements which have made the interurban service such a success will act also in the case of the new city service.

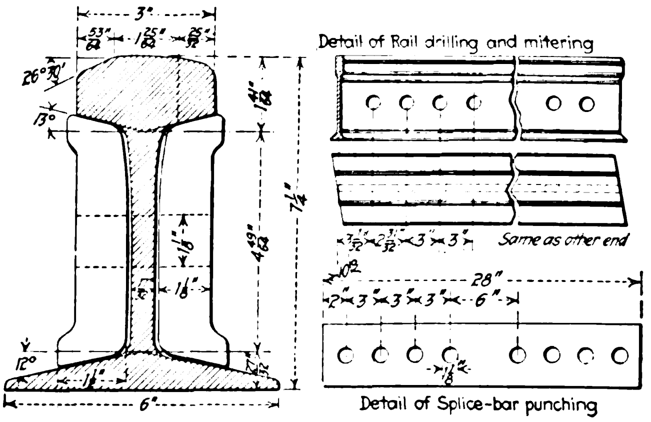
More than a year of service with the lightweight interurban cars has demonstrated that, under such conditions as exist around Lexington at least, a one-man double-truck car is well adapted to reasonably high-speed interurban transportation. Data for the first year's operation show a doubling of the net revenues from the interurban lines and material reduction in practically all elements of operating cost.

The complete elimination of bus competition was a notable victory for the new interurban cars. Hourly service is given, with a schedule speed of between 19 and 20 m.p.h. The car leaving Lexington on the hour reaches Nicholasville, 12 1/10 miles away, forty minutes later, making five stops between. From Lexington to Georgetown, 12 3/10 miles away, the time is forty-five minutes, with six stops between. Paris, 17 8/10 miles from Lexington, is reached in fifty-five minutes, with four intermediate stops. Frankfort, the State capital, 14 1/2 miles away, is reached in forty minutes, with three intermediate stops between. These interurban lines cover the noted blue-grass country and in good weather riding is popular for recreation, while the interurban traffic is good in all seasons.

As in the case of Huntington, the Lexington company does a considerable power business, not so large, however, in proportion to the total. A profitable side line is the manufacture of ice which is distributed as well as made by the company. The company owns and operates Blue Grass Park, located a few miles from the city on one of the interurban lines. While this park attracts considerable patronage it is not a particularly profitable side line for the company.

Mitered Rail Joints in Cleveland

FOR the past year the Cleveland Railway has been using mitered joints for its city tracks, and the connection made is so good that it is very difficult in most places to tell by observation where the joints are in the track. The mitering is on an angle of 10 deg. Besides being mitered, the ends of the rails are undercut 1/32 of an inch. For this extra work of mitering and undercutting on the ends of the rail, the company pays 50 cents extra per ton. A section of the standard rail used is shown in the accompanying drawing. The method of making the joint is as follows:


3"
26°
13°
12°
6"
Detail of Rail drilling and mitering
Same as other end
28"
10°
Detail of Splice-bar punching

Standard Cleveland Rail (L. S. 102-516) with Splice Bar Used with a 10-Deg. Mitered Joint

After the rails are butted close together and the splice bars are laid out, a drift pin is set in through the bolt hole in each rail nearest to the joint. These holes are 3 1/32 in. from the end of the rail, as shown in the drawing, while in the splice bar the two holes are only 6 in. apart. This allows a 1/16 in. draw and closes the joint when the drift pins are driven in.

Before the drift pins are driven in place, the splice bars are bolted up, but as the holes in the splice bar are not exactly opposite the holes in the rail, 1-in. bolts are used in the 1 1/8-in. holes. The drift pins are then driven in. If there should then be any space between the ends of the rails, the drift pins are taken out, a shim is inserted, and the drift pins are again driven in place. The next step is to take out the 1-in. bolts one by one and the drift pins and insert 1 1/16-in. rivets. Then the splice bar is seam welded to the rail and the rail to the base plate.

In this process the seam weld is carried all the way across on the top of the splice bar, but in the bottom seam a 3-in. gap is left in the welding around the joints to take up any little give that might occur at that point.

This joint was developed by Charles H. Clark, engineer maintenance of way of the company. The undercutting of the rail and the drift pin method of making the joint have been used for a number of years, but mitering was introduced, as mentioned, in 1922.

Price Changes in German Railway Materials

A TABULATION is made in a recent issue of *Verkehrstechnik* showing the comparative price of various materials used by railways in Germany before the war and the price as of June 29, 1923 for the same articles. The figures make us smile, but for the German it is tragic. Perhaps we can console ourselves by looking at these figures, when we reflect on what a dollar used to buy.

Material	Measure	Price Before the War, Marks	Price June 29, 1923, Marks	Percentage, Increase
Coal briquettes ...	Ton	12.50	966,900	7,735,000
Lump coal..	Ton	12	698,100	5,817,500
Wrought iron	Ton	93.50	5,200,000	5,561,500
Rolled forms.	Ton	107	6,300,000	5,887,800
Electrolytic copper ...	Kilogram	1.34	51,570	3,848,500
Lead	Kilogram	.39	18,750	4,807,700
Zinc	Kilogram	.45	20,750	4,611,100
Tin	Kilogram	3.27	141,500	4,327,200
Machine oil.	Kilogram	.26	13,000	5,000,000
Petroleum ..	Kilogram	.26	6,100	2,346,000

In the meantime street railway fares have increased from one-tenth of a mark to 1,200 marks—an increase of 120,000 per cent. The article mentions also the increased price of foodstuffs. These figures in general show a smaller proportion of increase than the price of electric railway material. It is interesting to note that the price of beer has advanced in the same ratio as the average street railway fares in Germany.

Eliminating Sludge in Turbine Lubrication

FOR some months researches have been under way in the laboratory of the Carnegie Institute of Technology at Pittsburgh to determine the factors causing sludge to form in the lubricating system of turbines and to determine methods for eliminating the sludge. The preliminary experiments showed that all of the sludge compounds examined contained fatty acids, proving that the hydrocarbons of the mineral oils had been oxidized. These fatty acids were usually present in the form of metallic soaps. Examination of the sludges led to the belief that these soaps form the greases which comprise the major portion of most of the sludges.

Association News & Discussions

Wired Wireless Over Power Lines[*]

High Frequency Automatic Telephony as Applied to Railway and Central Station Service Has Practical Possibilities in Load Dispatching

By C. A. Boddie,
Radio Engineer, Westinghouse Electric & Mfg. Co.

HIGH frequency telephony has now been developed to the point where it can be used successfully for communication over high tension power lines. Companies in the past have had difficulty in maintaining satisfactory communication over their private telephone lines when carried on the same poles as the power line. Telephone lines directly exposed to such high voltage are invariably noisy. The power line affords a dependable medium of communication superior in mechanical strength to any telephone line which can be constructed. This new method has demonstrated its superiority over the wire telephone during storms.

Super-position is the fundamental principle on which high-frequency telephony is based. The equipment used is substantially the same as that used in radio. The superimposed high frequency currents are introduced into the power line by an antenna wire carried on the same pole. Separate antennæ are used for transmitting and receiving, with the former preferably above the latter. By this means high frequency currents are induced in the transmission line.

For this class of work frequencies between 30,000 cycles and 150,000 cycles are the most desirable. The lower frequencies are best suited to long distance communications, while the higher frequencies do well for short distances. The system is duplex, that is, it provides for simultaneous talking and listening, as with the usual wire telephone. In this respect it is superior to radio, as it is impossible to send and receive simultaneously with the latter.

In striking contrast to wire telephone communication with its relatively high efficiency, only an infinitesimal part of the transmitter output of radio apparatus ever reaches the desired receiver. The efficiency of a power line for the transmission of high frequency current is somewhat better than ordinary radio, but still inferior to the wire telephone.

Each station is provided with an automatic telephone desk set, including an automatic call dial, a bell, megaphone and receiver. The operation of calling is accomplished by dialing the desired number on the automatic dial exactly as is done with the ordinary telephone of an automatic wire exchange. The use of a selector which closes only after receiving the proper impulse, makes it possible to call any particular party along the power line to the exclusion of all other parties. By the installation of an extra selector at each station provision may be made for a general call. This is a feature of considerable value to a load dispatcher.

Two wave lengths are ordinarily used, one for transmitting and one for receiving. The dispatcher may transmit at 50,000-cycles and all his stations are tuned to receive at this frequency. The latter are then arranged to transmit at 60,000-cycles, so that the dispatcher by means of his selective calling system can communicate with any station, but the outlying stations cannot communicate with each other. Since they all transit at 60,000-cycles and none are tuned to receive it, this makes it necessary for all stations to clear through the dispatcher, which is the normal and desirable method of operating a dispatching system. If, however, it is desired to permit the outlying stations to communicate between themselves, this can be done by changing the wave length adjustment of the calling station to agree with that assigned normally to the dispatcher.

New England Men Take Outing, Enjoy Day at Canobie Lake

NEW ENGLAND street railway men to a number of about 300, took a day off on July 26 to celebrate their annual outing, which was held this year at Canobie Lake Park, the pleasure resort of the Massachusetts Northeastern Street Railway. An extensive and pleasurable program had been drafted by the committee on arrangements, of which R. D. Hood, president of the club and vice-president and general manager of the Massachusetts Northeastern Street Railway, was chairman. The attendance mentioned, 300, is said to be larger than at any previous outing of the club.

People came by automobiles, electric cars and buses. The morning and afternoon were given over to various athletic contests, of which the outstanding event was the annual ball game between the railway men and the supply men. Edward Dana was manager of the railway team and Charles Wood of the supply team, and the costumes worn were weird. The railway men won by a score of four runs to three in a game of four innings. Those who wished to play golf had an opportunity to play at the Merrimac Valley Country Club.

The meeting ended with a chicken and lobster dinner in the dining room.

The committee on arrangements, besides President Hood, who acted as chairman, was David A. Belden, reception; Howard Fritch, attendance; H. B. Potter, transportation; F. E. Webster, lunch and dinner; E. H. Wilkinson, sports and prizes; J. W. Belling, secretary.

Maryland Utilities Organize

Initial Meeting Instigated by Public Service Commission and Delegates Are Guests of the Governor

TO PERFECT the organization of the Maryland Public Utilities Association, representatives of fifty-three utility companies met with the State Public Service Commission, July 26, in the chamber of the House of Delegates, at Annapolis, Md. In that room where so many of the State's laws are made, the officials of the Maryland public utilities, having the hearty co-operation of the men who represent the public in their affairs and regulate rates, wrote a new chapter in the moral laws of the State. And this new law, all the more stringent because of its origin, is the crystallization of sentiment of those who manage Maryland's public utilities today, as embodied in the word —service.

In his address to the members of the association, Governor Albert C. Ritchie, spoke of that "Service." In fact, he suggested that the Association should substitute the name "Service" for "Utilities" in its corporate title so that the Association's very name would bespeak the aims of the officials and employees of the companies composing the Association.

Service, said the Governor, meant the realization by officials of public utilities that they are servants of the public or quasi-public officials. Their duties to the public are as high as, and even more intimate than, the duties of public officials duly elected by the people. People today depend so much in the daily routine of their lives upon the water, gas, electricity and railway companies that the service these corporations render must be of the right kind; it should be constant, honest and courteous. The Governor declared that the meeting was one of the most progressive steps the State had taken in years and he urged upon the representatives present that they take the people more and more into their confidence.

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[*] Abstract of a Paper Presented Before the Central Electric Railway Association at Cedar Point, Ohio, July 20.

Emory L. Coblentz, president of the association and president Potomac Service Company, Frederick, Md., emphasized the value of co-operation with the public and showed the pleasure he felt because of the interest aroused. "Through our organization," he said, "every utility in the State may gather lessons which other organizations have learned through hard experience. The Public Service Commission, which really started the move, will have its work lightened when it works with an organization whose sole aim is service. We can now adjust many of our minor troubles, and, what is more important, we may avoid many of them."

Excoriating the "public-be-damned" policy which unfortunately appeared to be the attitude of a good many public utility companies until recently, Charles M. Cohn, vice-president of the Consolidated Gas, Electric Light and Power Company, Baltimore, spoke of the rapid progress that could be made through co-operation. "The public-be-damned spirit of our forefathers is antique and not wise in our day," Mr. Cohn said. "I have seen this tried. Our lines of business will never run with any smoothness until we have learned a lesson in common courtesy and have forced our employees to follow our example. We cannot successfully disregard our customers' feelings any more than a merchant in a highly competitive business can."

Among other speakers were: C. D. Emmons, president United Railways & Electric Company, Baltimore, and president American Electric Railway Association; Labert St. Clair, director advertising section, American Electric Railway Association, and George W. Oxley, National Electric Light Association, and representatives of the gas, telephone and electric light companies.

The matter of dues was settled upon to run from $10 to $700 a year per company, in proportion to gross earnings ranging from less than $10,000 to more than $5,000,000.

Permanent headquarters for the organization were chosen at the Engineers' Club, Baltimore. Governor Ritchie entertained the entire delegation at a luncheon held in the Executive Mansion.

Three-wire Distribution for Electric Railways

In a paper presented before the Winnipeg branch of the Engineering Institute of Canada Feb. 15, 1923, W. Nelson Smith, consulting electrical engineer Winnipeg Electric Railway, discussed the three-wire system of distribution. This has been applied for the mitigation of electrolysis on electric railways where the installation of the other recognized methods of mitigation, such as increase in the frequency of substations and the negative drainage system, is prohibitive on account of the cost.

In the paper the writer reviews the theoretical study made by E. R. Shepard of the United States Bureau of Standards. The method of sectionalizing the trolley is favored to limit the flow of current in the neutral. In Winnipeg, which has very light track rails, weighing in many cases only 60 to 70 lb. per yard, the sections are between 800 ft. and 2,700 ft. in the central portion of the city. Automatic reverse-current switches are installed in the neutral so that when the drainage current reverses so as to draw stray current from the underground structures the circuit is opened. By this means the drainage of underground pipe systems has been entirely avoided in the Winnipeg installation.

The paper has been printed in full in the *Engineering Journal* for May and in the *Sibley Journal of Engineering* for May and June.

American Association News

Engineering Association Nominations

The committee on nominations of the Engineering Association, consisting of F. R. Phillips, chairman, C. A. Greenidge, C. S. Kimball, F. H. Miller and S. Withington, has submitted the following names for the offices to be filled:

For president, H. A. Johnson, assistant to general manager Metropolitan West Side Elevated Railway, Chicago.

For first vice-president, C. H. Clark, engineer maintenance of way, Cleveland Railway.

For second vice-president, R. C. Cram, engineer surface roadway, Brooklyn-Manhattan Transit Corporation.

For third vice-president, C. R. Harte, construction engineer The Connecticut Company.

For secretary, J. W. Welsh, executive secretary American Electric Railway Association.

Members for executive committee: Daniel Durie, general superintendent West Penn Railways, Connellsville, Pa.; R. H. Dalgleish, chief engineer Capital Traction Company, Washington, D. C.; E. H. Scofield, engineer power and equipment, Twin City Rapid Transit Company, Minneapolis, Minn., M. B. Rosevear, superintendent of distribution, Public Service Railway, Newark, N. J.

Insurance Committee

The Insurance Committee of the American Electric Railway Association met in Cleveland on July 12. The report which is to be presented at the convention in October was completed and sent to the executive committee for approval. Those present at the meeting were John T. Staub, chairman; Granville H. Bourne, N. H. Daniels and John H. Moran.

Special Taxes

The committee on special taxes of the American Association was held in New York City on July 31. Those present were W. H. Maltbie, chairman; A. G. Neal and F. W. Doolittle, representing Edwin Gruhl. The tentative report of the committee was read and discussed. A questionnaire had been sent out to get information covering the various kinds of taxation levied, and to some extent the total amount of such taxes in the United States, to show the burden carried by the industry. The report contains a discussion of the federal income and excess profit taxes, the conflict between state and Federal regulations on depreciation in connection with taxation, problems of state and local taxation, and special imposts for particular purposes such as paving, etc.

Standard Classification of Accounts

The Accountants' Association committee on standard classification of accounts met in New York on July 17. Members present were R. N. Wallis, chairman; M. W. Glover, H. L. Wilson and M. R. Boylan for P. S. Young.

Mr. Glover had previously prepared and presented for the consideration of the committee a standard classification of accounts for motor vehicle operation, which was based to some extent on the accounting systems used by motor bus companies, while it also followed the general trend of electric railway classification of accounts. The committee discussed this proposed classification of accounts and proposed a number of revisions. It was felt that it would be desirable, so far as possible, to adhere to the arrangement of items in the electric railway accounts, modifying such items as necessary to apply to vehicle operation. Mr. Boylan agreed to revise the proposed classification in line with the discussion, and to submit it to committee members for further comment and criticism.

Cost of Highways

The committee of the American Association on cost of construction and maintenance of highways, W. J. Harvie, chairman, held a meeting at association headquarters on July 25. A tentative report was drafted for presentation at the October convention. Data has been collected by the committee covering the costs of highways in various states through the co-operation of member companies, although on account of the incomplete methods of keeping records in some states the list does not cover some of the states. What information is available will be included in the report.

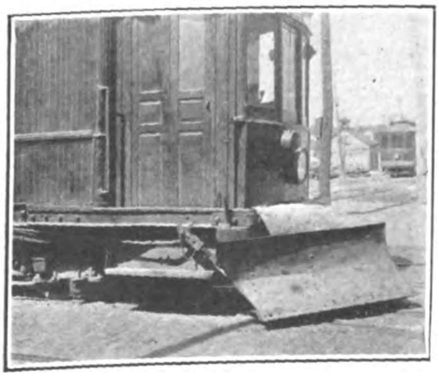
Maintenance of Equipment

Fan Ventilator in Hartford

THE machine shop in the repair shops of the Connecticut Company at Hartford was installed some years ago when belting and shafting were used to a much greater extent than at present. A number of the machines are motor driven, but the fact that there is an overhead shaft has enabled the company to put in a simple overhead fan for keeping the air moving. It consists of a kind of paddle wheel, made up of wooden hub with two arms, each about 2½ ft. long, with a wide paddle on the end of arm. These keep the air moving, and as the hub is split and bolted to the shaft, the fan can be removed in winter.

Demountable Nose for Emergency Car

DURING stormy weather when an emergency car is needed, it is very important that the car reach its destination promptly. In order to provide for clearing its own track and also to serve in snow removal as needed, the Easton division of the Lehigh Valley Transit Company has designed a snow nose for its emergency car, which can be attached and detached in three minutes.



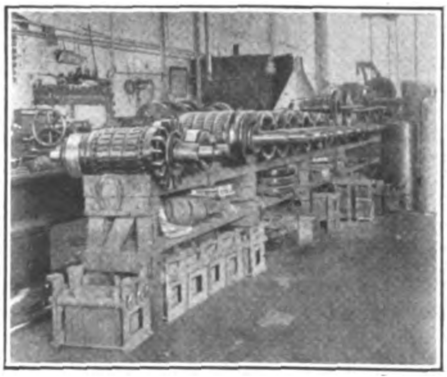
Nose on Emergency Car

The nose is made of sheet steel and shaped so as to throw the snow clear of the running rail. An angle-iron framework gives strength and has provision for support. The nose is held in position by threaded rods with turnbuckles. There are three of these, one in the center and one at each end. The front end of the emergency car has been strengthened with a T-rail, and the turnbuckles with their rods are fastened to this, forming a strong support. In order to prevent snow from getting in over the top of the nose a sheet iron protection is provided.

Storing Repaired Armatures on a Level Bench

AFTER careful study of all methods of storing repaired armatures, the Virginia Railway & Power Company has concluded that horizontal storage is the most convenient in its shop at Norfolk.

As shown in the illustration below, a long, stout bench is provided in the commodious armature section of the shop. This is of a height to bring the shaft of the motor to about 3 ft. above the floor, a height which facilitates the fitting of bearings to the journals. In fact, one of the chief advantages of this method of storage is that bearings may be fitted to any journals of armatures on the bench, without disturbing others. The arrangement also makes it easy to pick up any armature by means of the gib cranes and trolley-bar hoists, with which the shop is liberally equipped.



The Men in the Electric Railway Shop at Norfolk Prefer to Store Their Armatures on a Bench About 3 Ft. Above the Floor

While the bench described above is primarily for armatures, the space below the table is by no means wasted. Shelves fitted between the legs at proper height are convenient for storing field coils, resistors, etc.

The horseshoe nailed to the near end of the bench is symbolic of the atmosphere of this cheerful shop.

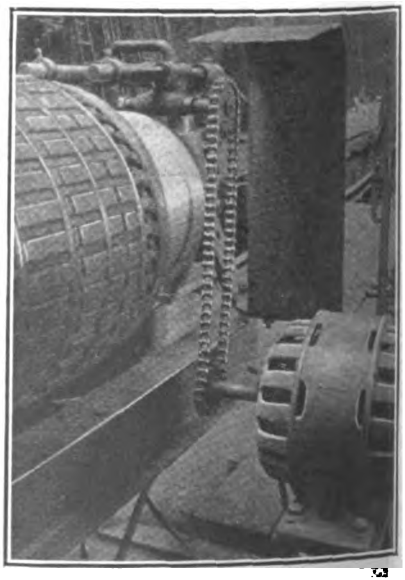
Commutator Slotter with Chain Drive

A MACHINE for undercutting commutators of electric railway motors which is giving good results in the shops of the Terre Haute Traction & Light Company is driven by an electric motor through a bicycle chain.

In this device a 1¼-in. saw is mounted on one end of an arbor which carries on the other end a pinion with the same number of teeth as that on the motor shaft. The arbor is carried in a long bearing which forms part of a carriage sliding on two round rods. These rods are in turn supported from a substantial pedestal bolted to two I-beams which form from the bed of the machine. A handle is cast together with the carriage for the convenience of the operator. Stop collars on the rods limit the stroke of the saw. A sheet-iron housing is placed over the chain on the side toward the operator.

Provision is made for adjustment of the saw arbor to accommodate commutators of different diameters, by an adjusting screw which is mounted under the motor table. This permits it to be raised and lowered. One chain therefore serves for all commutator diameters.

The saw is run in such a direction



A Commutator Slotter Which Is Giving Good Results in Terre Haute that the chips are lifted out of the slot, that is, the advance side of the saw travels upward. This minimizes the danger of leaving chips in the slot.

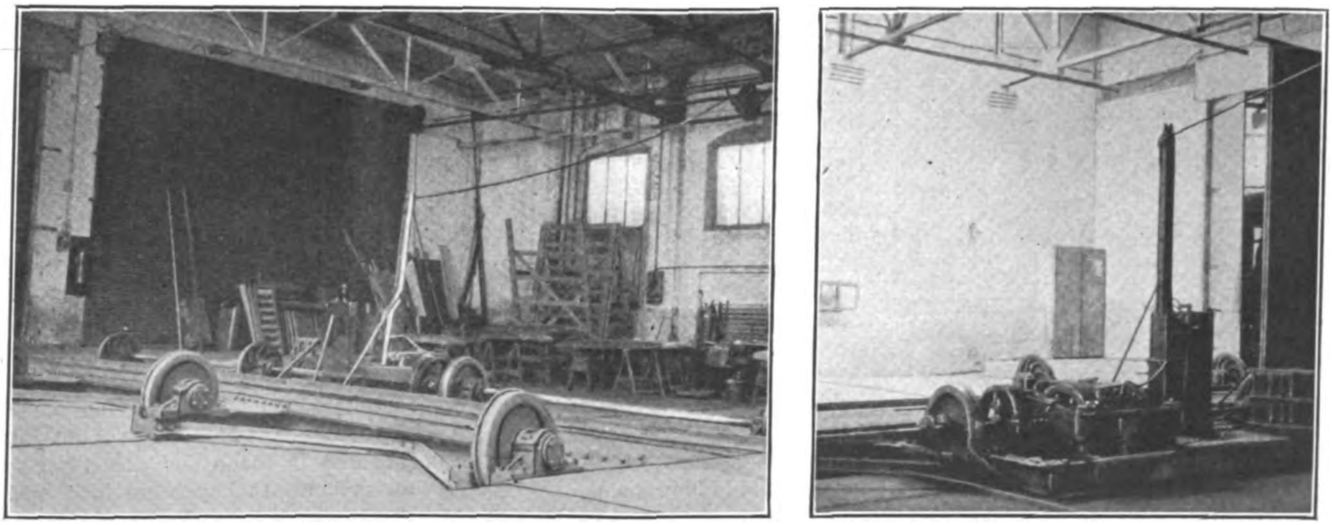
Reel for Transfer Table

For an inside flush transfer table, serving only a few tracks, a more convenient source of current supply than an overhead wire is desirable in many cases. When power is taken from above, the longitudinal wires in the carhouse have to be cut to provide for the transfer table wire at right angles to them, or else there must be a right-angle frog in each wire. Again the trolley pole has to be turned every time that the direction of the transfer table is reversed.

All these objections are overcome by a method used in the Grand Avenue carhouse of the Connecticut Company in New Haven. Here the cable supplying power to the transfer table motor is coiled on a reel close to the ceiling at one end of the transfer table run, and the cable between this reel and the transfer table is kept taut by means of a weight operating over a reel on the same shaft as the cable reel but smaller in diameter.

The other end of the cable is attached to a post on the transfer table, the post being about 7 ft. high, so as to clear the head of any operator working the table. The runway is about 40 ft., so that only about this amount of cable is required for operating the table.

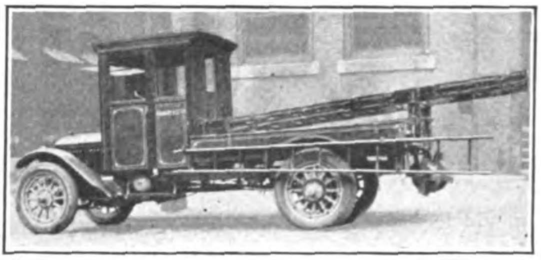
The device has been in use for many years at the Grand Avenue carhouse, and has proved very satisfactory.



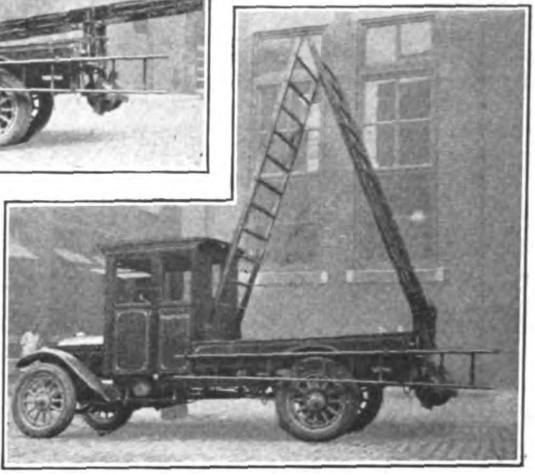
Power for This Transfer Table Is Supplied By a Cable Coiled on a Reel

A Quick-Action Ladder Truck

ALWAYS standing near the operating headquarters of the Nashville Railway & Light Company, when not out on the line, is an emergency ladder truck, which combines effectiveness and simplicity. The truck comprises a light wagon body with an inclosed cab for the driver. On the body is a pair of 12-ft. ladders, so mounted that they can be folded together and laid lengthwise over the body without taking up any of the useful space therein.



This Ladder Truck Is a Time Saver in Nashville When Folded the Ladders Occupy Practically No Useful Space on the Truck



The Ladders Are Hinged at the Top and One at the Bottom Front End

Referring to the illustration at the right, which shows the truck, it will be noted that the ladders are hinged together at the top and the lower end of one is hinged at the front of the body and about 6 in. above the side boards. The lower end of the other ladder is hooked onto a crossbar supported by steel straps at the rear of the side boards.

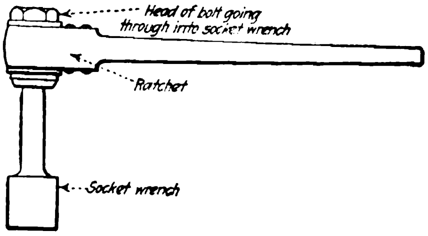
To fold and lower the ladders, all that is necessary is to unhook the bottom of the rear section and shove it forward. The folded pair then rests on the same crossbar which serves to support the rear one when the ladders are raised. The operation of raising or lowering occupies but a few seconds.

As a supplement to the inverted-V ladder, a light auxiliary ladder is carried on hooks on the side of the body.

Ratchet Socket Wrenches Facilitate Repair Work

THE West Penn Railways, Connellsville, Pa., has found that socket wrenches of the ordinary type are quite difficult to handle in restricted places. To overcome this, Daniel Durie, general superintendent, has designed a ratchet socket wrench which is being made standard for the company. This consists of a standard ratchet wrench, to which is attached by a through bolt a socket wrench of the ordinary type. Wrenches of this type have been provided for various sized nuts and of various lengths covering all of the different work done in the shop. The wrenches are kept on a wall board so that the workmen have little difficulty in selecting the correct wrench for any particular job.

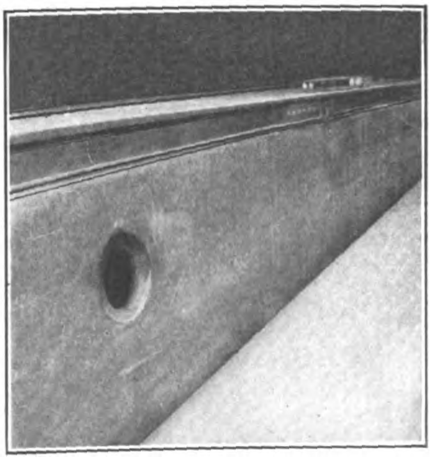
The great advantage of the ratchet wrench is that a very small movement of the handle will enable the ratchet to move forward one notch so that the bolts can be tightened or loosened in places where it would be entirely impossible to work with the ordinary hexagonal or square socket wrench.



A Socket Wrench Is Combined with a Standard Ratchet used for Drilling

Warm Air Is Useful in the Pit

AN INGENIOUS method of heating the overhauling shop is that used by the Consolidated Electric Light, Heat & Power Company (Ohio Valley Electric Railway) in Huntington, W. Va. Warm air is delivered by a ventilating fan through 15-in. tile ducts laid in the spaces between the pits in the shop; branching from the large ducts are 12-in. tile ducts which open into the pits about 25 ft. apart. Warm air thus delivered is well distributed through the shop, and if a car comes in wet or covered with snow and ice, it will be quickly dried out if it is stopped over one of the duct outlets.



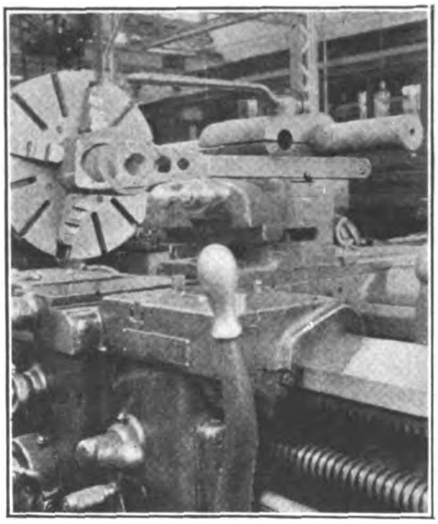
In Huntington Railway Rolling Stock Is Heated with Air Forced Out Through 12-In. Outlets in the Pit Walls

A feature of the heating and ventilating system in this shop is the reuse of the air from the shop rather than the drawing in of fresh air from outside. This economy is said to save an appreciable amount of coal each year.

A Substantial Carrier for the Boring Bar

IN THE machine shop of the Knoxville Power & Light Company, a number of ingenious devices have been adapted to the excellent machine tools with which this shop is equipped. These devices are due to collaboration between J. M. Kingston, master mechanic, and W. C. Duggan, foreman of the machine shop.

Among these devices is a boring-bar holder which fits into the lathe carriage in place of the tool post. It consists of three principal parts, a plate grooved out at the two upper corners to fit into the groove in the carriage, and two clamping blocks bored to accommodate the largest two boring bars to be used. When a boring bar is placed between the clamps, it is held securely in position and the clamp is drawn down tight on the carriage by means of two bolts passing through the clamp and into the grooved plate first mentioned.



Four Sizes of Boring Bars Can Be Used with This Clamping Device

The bars used in connection with this holder are threaded on one end and nuts slotted to hold the tools are tightened against the end of the bars by means of a special wrench, which is visible in the picture lying in front of the clamps. This wrench is bored to fit all of the boring bars used and a diagonal slot is cut across the face of the wrench through the center of each circle. When this wrench is slipped over the nuts, the cutters are engaged with the groove so that the nut can be tightened, clamping the cutters firmly in position.

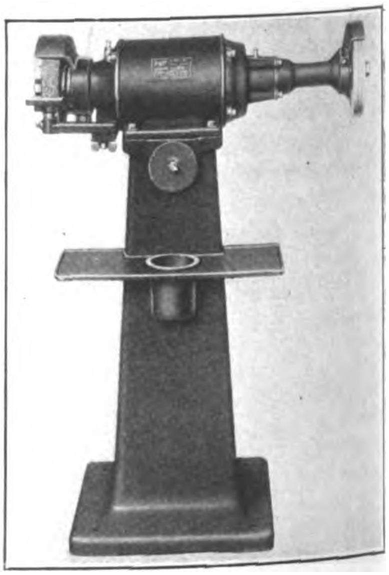
As the holes in the wrench indicate, four sizes of bars are used with this device. Because the boring bar holder is arranged to clamp but two different sizes, when the smaller two bars are used the holes in the clamp are bushed.

These boring bars are used for boring gears, pinions, bearings or anything else that can be bored out in the chuck of a lathe.

New Equipment Available

Combination Grinder and Buffer

A NEW design of machine for grinding and buffing is being marketed by the Hisey-Wolf Co., of Cincinnati, Ohio. This machine is particularly useful for a large variety of work requiring the use of a grinding wheel, buffing wheel, wire brush wheel or rotary wire rasp wheel. The spindle extension is a separate unit and is connected to the motor armature shaft by a clutch. The shaft unit is supported by two ball bearings which provide a very rigid construction. The 1-hp. size machine is made for direct-current operation. It has a no load speed of 3,200 r.p.m. and uses an 8-in. x ½-in. grinding or buffing wheel.



New Design Machine for Grinding and Buffing

The News of the Industry

Transit Funds to Be Merged

Proposal to Be Voted Upon in Philadelphia Sept. 18—Arch Street Loop Contract Let

The City Council of Philadelphia on July 27 passed the referendum ordinance which provides for the submission to the people at the primaries on Sept. 18 the question whether the funds hitherto authorized by the people for various transit programs should be merged in the project designated as "Step 1." Although the vote was sixteen to one Richard Weglein, president of the Council, said that he had hoped the vote would be unanimous, that the Council had now taken all measures possible to give relief to the car riders who had been complaining for a long time. Further he hoped that the engineers would get together in the near future to make an early start on the great work as soon as the people had expressed their will in the matter.

ALL FUNDS CONSOLIDATED

The ordinance which the Council approved will combine all the available separate funds heretofore authorized for transit purposes into one for the construction of "Step 1" of the high-speed transit program. That step includes the construction of the Broad Street subway, the delivery loop down Ridge Avenue and around Eighth Street, and then out Walnut and Chestnut Streets to Forty-second Street and Woodland Avenue where it would become an elevated structure to Darby. These funds total about $42,000,000.

In presenting the bill President Weglein briefly told about the creation of the commission and its subsequent activities for the adoption of the so-called "Step 1" of the transit program. He emphasized the fact that the ordinance had nothing to do with the suggested Chestnut Street surface-subway project.

Included in the referendum is the $7,500,000 previously authorized for a Parkway subway—Twenty-ninth Street-Roxborough elevated line. He said that this $7,500,000 was again incorporated in the referendum for the Northwest lines with a change which will enable a subway to be built in whole or in part where an elevated was at present authorized. This suggestion was made by him because he believed that while elevated roads were cheaper in their initial cost, their upkeep was more expensive and their life more limited than a subway. Further, the plans for the line in Forty-second Street were changed from an elevated to a subway in recognition of the fact that property owners protested that elevated roads depreciated strictly residential neighborhoods without corresponding compensation.

The Council will meet on Aug. 7 to receive Mayor Moore's decision on the referendum ordinance. It is anticipated that he will veto the measure.

While the Council was acting on the comprehensive transit program, Mayor Moore awarded a contract for the building of the Arch Street loop for $1,199,555 to the Keystone State Construction Company. The loop is not a part of "Step 1" of the transit plans as approved by the Councilmanic Transit Commission.

Scarcely had Mayor Moore finished signing the contract for the construction of the proposed Arch Street subway when a taxpayer's suit was filed blocking all work on the project until Aug. 6. The suit is based upon the allegation that the Keystone State Construction Company, which received the contract, was not the low bidder and that the firm making the lowest figure had been ignored.

Chicago Elevated Pay Increased Three Cents

Employees of the Chicago Elevated Railroads will receive an increase in wages of 3 cents an hour for the year ending June 30, 1924, and an additional 2 cents an hour increase for the twelve months period after that date.

This wage award was made by the arbitration board, which settled the wage dispute between the employees and the railroad. The rate of pay increase is the same as fixed recently for employees of the Chicago Surface Lines.

The new 1923 scale in cents per hour for trainmen on the Elevated was fixed as follows: Motormen, 75 cents; conductors, 70 cents; guards, 68 cents; extra guards, 67 cents.

This award is retroactive and the back pay, due from June 1, 1922, will be paid on the pay day for the second half of August. The new rate will be paid on the pay day for the first half of August.

On the basis of 250 hours per month, average put in by trainmen (extra guards excepted) the men will have $7.50 extra in their envelopes for the second half of August, a similar addition each month for the coming year and an additional $5 a month beginning June 1, 1924.

The men asked for an increase of 10 cents an hour, which would have put their pay back at the figure they attained in 1920 and which was reduced a year ago.

$84,000,000 Program

28 Miles of Long Island Railroad to Be Electrified as First Step in Vast Improvements

The Long Island Railroad will extend its electric zone from Jamaica to Babylon on the Montauk Division by July, 1924. This means about 28 miles of double-track electrification. This statement was recently made by George Le Boutillier, vice-president of the Long Island Railroad, at a "get together" meeting of the Long Island Press Association, the Long Island Association and the Long Island Railroad at Patchogue. He said that the company had mapped out a ten-year improvement program which called for the expenditure of upward of $84,000,000. This is more than the railroad's present total investment in road and equipment. He believes that the money will be forthcoming as he claims the railroad is earning a profit and its credit has been restored.

Mr. Le Boutillier reviewed the history of the Long Island Railroad from the time when Ralph Peters took charge of this "summer excursion line" to the present day, when it has become one of the "greatest passenger-carrying trunk line railroads in the United States, if not in the world." The population of the territory served has accordingly increased until today it is greater than the combined population of eight states.

He said that the railroad enjoyed the distinction of being the first suburban railroad to electrify and is still the most extensive installation for multiple-unit electric operation in the United States. Electric train service was first started in 1905 between the Flatbush Avenue terminal, Brooklyn, and Rockaway Park. Since that date electrification has been extended until now there are 227.2 miles of electrified track in operation on the Long Island system.

How both traffic and freight have increased is shown by the fact that in 1901 the Long Island carried 14,520 218 passengers and in 1922 79,656,891 passengers, while freight to the amount of 1,642,937 tons was hauled in 1901 compared with 6,027,860 tons in 1922. In 1903 the company had 5,400 employees, who received $3,065,000 in wages, and in 1922 the employees numbered 8,585, who were paid $14,702,000. The gross earnings in 1901 were $4,862,347, compared with $30,951,540 in 1922. Although the net income from operation in 1922 was more than $2,000,000, improvements already under way call for the expenditure of nearly $7,000,000 in 1923.

"Say It with Shovels"

Petitions Aplenty But Subways Scarce in New York—Merchants Act —Mayor Counters

The Merchants' Association of New York is backing the Citizens' Committee of One Thousand, which has recently been formed to try to secure transit relief in the city. The committee has already begun its work of securing signatures to a petition to be presented to the Board of Estimate, urging the immediate construction of new subways. The chairman of the committee is Frank D. Waterman, president of the Waterman Pen Company. The slogan of the committee is "Say It With Shovels."

CROWDING INTOLERABLE

Mr. Waterman issued a statement calling upon every subway rider to voice his approval to the plan for the immediate digging for new subway lines. He said that a lot of debating had been going on for about ten years on the subject of construction, but that a new subway had not been authorized since 1913. Further, that no other town or city in the country would put up with the crowding that New Yorkers are forced to face twice a day in the subways.

The petition is addressed to the members of the Board of Estimate and asks them to take steps at once for the construction of the proposed new Brooklyn crosstown subway and Washington Heights subway in Manhattan. The petition refers to the agreement existing between the Transit Commission and the Board of Estimate on the construction of the two lines above mentioned, but states that differences of opinion have caused the board to withhold approval. The question of the municipal operation of the subways can be decided while the two lines are being built, according to the petition.

The Committee of One Thousand has pointed out that the population of the city is increasing at the rate of 160,000 a year; that no trunk line subways have been built in ten years, and that it will take five years to build a new trunk line subway. In the meantime, the congestion will grow worse.

MAYOR ATTACKS MOVEMENT

Mayor Hylan attacked the movement of the Committee of One Thousand and stated that he refused to be driven by Mr. Pierson through the instrumentality of a specious petition, or otherwise, to accede to the demands of the traction interests. He said that no more franchises, and particularly the $50,000,000 bus franchises, are going to be wrested from the people of this city, so long as he had the official power "to prevent such a robbery."

A counter-offensive was started by the Mayor directing the circulation of petitions appealing to the Governor and the Legislature for legislation to empower the city to establish the Mayor's proposed $25,000,000 bus system, to remove the Transit Commission and to provide for referendums on the questions of the city ending its transit partnerships with private corporations and the city's turning over bus franchises to transit corporations.

Burden of Paving Cost Lifted from Municipal Railway

The recommendation of the utilities committee of the City Council that the Seattle Municipal Railway be relieved of the burden of paying for paving between tracks has been concurred in by the City Council finance committee, and the burden will be transferred to the general fund, to come out of taxes or be assessed against abutting property, depending upon the circumstances in each case. E. L. Blaine, chairman of the finance committee, presented the only opposition to the plan, declaring that the "general fund has all it can do now." Councilmen indicated that the future policy probably will be to assess abutting property in the downtown streets for the strips of pavement between the tracks, and to contribute from the general fund in the residence district.

Council Rejects Plan Claiming Monopoly for Railway

The City Council at Toledo has practically rejected both the plan of Engineer E. O. Mills, working for Harland Bartholomew, city plan expert, and the modified plan proposed by the board of control of the street railways for rerouting, extensions and added bus lines and feeders to provide crosstown and additional service. The Council, sitting as a committee of the whole, voted nine to eight to reject the proposed plans largely because it would give the Community Traction Company, if carried out, a monopoly of all transportation in the city.

A substitute provision adopted at the meeting favored city-owned bus lines to compete with and operate independently of the traction lines.

It is believed, however, that when the Council meets again a compromise or substitute ordinance will be adopted. Aug. 1 was the limit for such request under the ordinance and two and one-half years are allowed to carry out the plan.

Municipal System Construction Up to Voters

Rapid transit for the city of Detroit appears a step nearer realization with the request by the acting Mayor that the Corporation Counsel draft two amendments to the city charter to permit the construction of a municipal rapid transit system. The amendments, one to permit the city to build its own rapid transit system, and the other, to conform with the new state bonding law for municipalities, are to be submitted to the voters at the primary election on Oct. 9. It is anticipated that the report of the rapid transit commission will be ready for submission to the voters before the October election.

Chicago Survey Suggested

Regional Plan Committee Wants Plan Developed for Co-ordinating Facilities for City of 6,000,000

Recommendations have been submitted by the Chicago Regional Plan Committee on (a) the extent of territory to be included in the metropolitan district of Chicago; (b) the features that should be studied in drawing up such a plan; (c) the best method for undertaking and financing such a plan.

The committee in its report states that the population of the city has increased 23.6 per cent during the last decade, while that within 10 miles outside the city limits has increased 76.3 per cent; and that all indications point to a more rapid growth during the next ten or twenty-five years. It seemed clear that the territory to be studied and planned should be that within a radius of at least 50 miles from the center of Chicago. The utilities are preparing for rapid increases of population, the telephone company estimating a population in the city of 4,000,000 by 1940, which means at least 6,000,000 within the metropolitan district by 1950.

All about the larger city are evidences of undirected and uncontrolled growth. There are not proper zoning and housing regulations. There is no comprehensive plan for extending transit facilities to the outlying cities and villages, and the lack of a co-ordinated and radiating highway system is known to all.

PHYSICAL SURVEY PLANNED

It is recommended by the committee that (a) a physical survey be made of the highways, waterways, steam and street railways, etc.; population, lands available for future development, and a study of the needs for public services; (b) an industrial survey analyzing factories and the influences affecting their distribution, and problems of rail and water facilities as terminals; (c) a health and housing survey covering problems of sanitation, zoning, and housing conditions; (d) an educational and recreational survey; (e) a survey of the various governmental organizations in the metropolitan area and of existing and needed legislation in so far as they affect the regional plan and its adoption.

After a discussion of various methods of financing and carrying on this work, the committee recommends the organization of "The Chicago Regional Planning Association," composed of voluntary individual members paying suitable dues. This association would draw to it more and more financial support and also the support of public opinion.

The Chicago Regional Plan Committee was appointed at a conference called by the City Club to consider the advisability of preparing a regional plan for the entire metropolitan district of Chicago. The chairman of the committee is Dwight H. Perkins.

More Wage Conferences

Detroit Railway Commission Opposed to Closed Shop—Men Deny Such Demand Has Been Made

Another conference has been arranged at Detroit in an effort to reach a working agreement between the City Street Railway Department and the platform employees of the Municipal Railway. The meeting will be attended by Frank D. Eaman, arbitrator for the Street Railway Commission; Judge Edward J. Jeffries, arbitrator for the railway employees; Ross Schram, assistant general manager of the Municipal Railway; Mayor Doremus and members of the Street Railway Commission.

Previous to this latest announcement it had been stated by G. Ogden Ellis, president of the Detroit Street Railway Commission, that the department had withdrawn from arbitration proceedings because union officers had made certain demands that the city could not entertain. On the other hand William B. Fitzgerald, first international vice-president of the Amalgamated Association, denied that recognition of the union and a closed shop had been demanded.

According to a statement by the Mayor, the city will not consider any agreement calling for the recognition of the union or the closed shop. The union has asked that a third arbitrator be appointed. Union officers were empowered to take a strike vote, it was announced, in event the third arbitrator was not appointed by Aug. 4.

The break in the arbitration proceedings came after the details of the pay agreement had practically been arranged. In the memorandum summing up the demands, the men included what the commission's representative considered a rigid organized labor contract calling for a closed shop. The Street Railway Commission has no power to recognize the union or institute the closed shop because of charter limitations. Moreover, city officials believe such a course to be against public policy.

A report by the commission, after a meeting between Judge Jeffries for the men and Mr. Eaman for the commission, stated that the men would not consent to the imposition of any conditions not incorporated in a contract with the union. The closed shop was not conceded as a matter for arbitration by the commission, that matter having been brought up last September when the former wage parley was held. Mr. Ellis said that the people of Detroit have voted many times not to grant any franchises and that the union really was asking a franchise in the street railway department, in which any citizen has a right to seek a job without joining any particular organization.

In denying the claim that recognition of the union and recognition of the closed shop were at issue in the controversy, the union's vice-president stated that the union officials are only interested in an increased scale of wages and in shortening working hours. Mr. Fitzgerald further stated that the negotiations as to wages and working conditions have been dragging along since March, when the men asked for an increase in wages of 20 per cent and a minimum working day. One source of objection now on the part of the men is that too many of them are now called upon to work intermittently through fifteen or sixteen hours.

Local No. 17 of the International Brotherhood of Electrical Workers, consisting of linemen and trouble men, has also asked for an increase in wages. The personnel of this department includes about forty men.

New Jersey Men on Strike

All Railway Lines Shut Down—Resumption of Service Unlikely for Some Time—Augmented Jitney Service Handling Traffic Expeditiously in Most Places

MORE than 2,500,000 people in the territory served by the lines of the Public Service Railway in New Jersey are depending for their local transportation on the jitneys and private automobiles. The trainmen in the employ of the company went out on strike on the morning of Aug. 1. Thomas N. McCarter, president of the railway, made a last-minute offer of an additional 5 per cent increase in pay to the men, but they rejected the proposal. This offer from the company was declared to be fully as much as the probable net receipts of the company under the most favorable estimates. The men had asked a 30 per cent increase. Through their representatives the men said they would come down to 60 cents an hour. This would have amounted to a 20 per cent increase. The men said they did not question the accuracy of the company's figures as to its receipts, but announced that they felt the financial condition of the company should not determine the question of wages.

No Agreement to Arbitrate Wages

On the Public Service Railway new men start at 46 cents, at the end of nine months they receive 48 cents, and at the end of the year 50 cents, but men on one-man cars, in addition to these rates, receive 5 cents extra an hour. The routine reports of the company to the Public Service Commission show that the average wage earned by all men of the system has been between $22 and $22.50 per week. The platform men earn considerably more than this as they get 75 cents an hour for overtime, and the average wage of the platform men has been $5.21 a day.

There was nothing in the agreement with the men as to arbitration except as to matters not specifically mentioned in the agreement. Thus working conditions not mentioned in the agreement were to be settled by arbitration. Wages were specifically mentioned in the agreement so were not to be settled by arbitration.

Mr. McCarter's attitude on the question of wages was that if the matter were to go to arbitration a member of the Public Utility Commission should sit on the board. He took the stand that if an increase in wages was granted to the men beyond the probable power of the company to pay it, means should be provided for the company to secure additional revenue either from an increase in fare or through stricter regulation of jitney operation. An arbitration board composed entirely of members whose responsibility would have ended with their decision of the wage matter would, of course, not have been in a position to do more than suggest relief to the company.

As for the company itself Mr. McCarter has previously pointed out its serious financial condition. He has officially announced that it will not use strike breakers. The cars have all been run into the carhouses. Where cars are stored in the open the company has removed the fare boxes and the control handles. Since the strike was called the company has been laying off some employees among the clerical forces, supervisory forces, traffic department and the inspection department. The services of these men are, of course, no longer needed. Several hundred employees will probably be included in this action. Apparently, the company is determined to see the matter through.

There is no need here to review the steps in the negotiations leading up to the final offer of the company to the men. The record of the recent moves has all been set down before. As matters stand now indications point to a prolonged suspension of service. On the other hand, however, there is the possibility of the governing authorities finding a way to provide means of additional revenue for the company, or of the men being prevailed upon from sources outside the company to return to work under a compromise promising relief to the company in the future. One such suggestion advanced is that the men go back at the old rates and that the company resume operation of all its principal lines, allowing the palpably unprofitable ones to remain idle. There is also talk of a possible receivership. This, however, comes from sources outside of company circles.

The situation in New Jersey with respect to handling the public in the present emergency is quite different from that which has prevailed in connection with most other strikes. In the ordinary strike an entirely new service has had to be improvised over night, but in the New Jersey case a transportation system by bus exists which in the ten principal cities in which the company operates carried 141,326,123 passengers in 1922 as compared with 325,265,180 pay passengers handled by the railway in the same year. The bus system of New Jersey, according to the latest state survey available for reference, include 174 routes for a total length of 1,300 miles over which there were 1,722 motor vehicles in service. With this as a nucleus the service has been expanded to bounds the extent of which can only be guessed. It is an open field now in Jersey for the auto operator because the Public Utility Commission, recognizing the present emergency, on Aug. 1 removed all restrictions pending the continuance of the strike. It is a hazard at best to attempt to say to what extent the regular jitney or bus service has been augmented, but it is estimated that at least 100 buses have been added to the 414 previously licensed in Newark. Mayor Hylan of New York, a good union man, has permitted thirty or more buses to be withdrawn from service in New York City presumably "to help break the strike for the men." In Camden there are 140 buses normally, but a count on Wednesday evening showed there were about 180 vehicles in service.

QUALITY OF TRANSPORTATION POOR

During the non-rush hours in Newark the buses have been carrying about 50 per cent of the entire business, but have been operating on the heavy traffic lines, and avoiding the lines less well patronized. They carry very much less than 50 per cent of the total in rush hours. The fare by bus in Newark is 5 cents within the city and 10 cents to the Oranges. During the non-rush hours the buses make about the same speed as the trolley cars. During rush hours they make slightly better speed. The fare on the railway is 8 cents cash with four tokens for 30 cents and 1 cent for a transfer. This rate is being charged under an order from the court on appeal from a finding of the State Utility Commission fixing the rate as of Aug. 4, 1921, at 7 cents cash with 2 cents for a transfer. The contention of the company has been for the right to a return on a valuation of $200,898,906 as opposed to a value of $125,000,000 fixed by engineers for the state under a special act of the Legislature and a valuation of $82,000,000 set by the Public Utility Commission.

Observations made in Newark on the evening of Aug. 2 showed the quality of transportation to be poorer than when trolleys were operated, and the cost generally higher in spite of a so-called 5-cent fare on the buses. It is usually necessary to take more than one 5-cent ride to reach the desired destination. Whereas the trolleys operated through routes across the business centers in all the principal municipalities, or gave transfers, the jitney lines nearly all terminate in the heart of the city. The number of foreign buses is about one-fifth of the normal number operating in the city. There are about the same number of old buses revived for the occasion and there are a very few improvised vehicles, making altogether an increase of somewhat less than 50 per cent in the total number of buses. Except during the afternoon rush hour there seems to be no worse overcrowding of the buses than usual. Between 5 and 6 p.m. all the buses run very full. The present is of course an emergency and as yet little attention has been paid to the character of the service. The total volume of traffic in Newark proper on Aug. 1 and 2 seemed to be considerably below normal. Traffic congestion in the streets appeared if anything less than when the cars were operated.

It would appear from the standpoint of the public that the determining factors which will bring about the return of the trolley cars will be the need for service to the suburbs rather than congestion in the center of Newark. The present emergency transportaton service is not intolerable. In Jersey City and Camden it would appear probable that the return of car service on some lines will be demanded, but in Paterson, Elizabeth and New Brunswick it would seem that the buses could continue to do all the business indefinitely without serious inconvenience to the traveling public.

There are a few political angles to the situation, but they are similar to those which arise in connection with every other similar suspension of service. Thus the Mayor of Newark says that the company abrogated its franchise rights when it raised the fare despite the limitations imposed in its franchise, and he has threatened to proceed to tear up the tracks.

All sorts of motives have been attributed to the company from outside for shutting down. Many contend that the strike really involves more than the question of wages. Like every other railway the company is not lacking in vilifiers. They profess to see in the strike a deep laid plan of the company:

> 1. To restrict jitney competition by keeping its cars idle until it can force the Public Utilities Commission or the Legislature to take action against the jitneys.
>
> 2. To get a 10-cent fare on the plea that it cannot pay higher wages on the present 8-cent fare.
>
> 3. To go into receivership, reorganize and get rid of unprofitable lines:

As for the company it made public on Aug. 2 its answer to the demands of the men which precipitated the strike. It is a communication from President Thomas N. McCarter to the members of the Amalgamated Association. He assures the workers that if they really knew the economic and financial distress of the company they would not be so selfish and heedless of their own welfare as to seek to force the company to pay higher wages. The letter contains a scientific discussion of the application of the varying cost of living of the last six years to street car wages and assures the workers that the existing wages are 23 per cent higher than demanded by the cost of living—notwithstanding high rents, which are acknowledged—at the moment. This statement is based on the long letter of July 17 to the men.

Many patrons and customers of the Public Service Corporation are stockholders in the company under its recent campaign to extend the idea of customer ownership among the residents of the territory served by it. In a letter to the stockholders Mr. McCarter said:

> It is my duty to inform you that the employees of Public Service Railway Company, one of the four principal subsidiaries of your corporation, have gone out upon strike as a result of a demand for increased wages which is not justified by the cost of living and which the railway company was without funds to meet. After the failure of negotiation, the railway company offered to submit the matter in dispute to the arbitration of the Board of Public Utility Commissioners of the State of New Jersey, the only body having any power to furnish the railway company with the additional revenue to meet any substantial raise in wages either through the elimination of jitneys or by an increase in fare. This proposition the men declined to accept.
>
> As a last resort, to prevent the inconvenience to the public of a strike, the railway company offered a 5 per cent increase in pay to the man which, if accepted, would have exhausted the railway company's treasury. This the men declined but insisted upon an increase involving a total annual additional expenditure of approximately $2,500,000, which the railway company was unable to meet.
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> As, however, the corporation has received no dividends from the railway company for the last five years, the strike and consequent interruption of service, while most unfortunate, will not substantially disturb the finances of the Public Service Corporation of New Jersey nor should it in any way interfere with the corporation's dividend policy, as the three remaining subsidiaries of the corporation are all carrying on a successful business.

Reverting to the matter of the air of gusto with which Mayor Hylan said he will lend aid to the people of New Jersey one of the striking trainmen is reported to have said:

> Fine union man. He is bus-crazy anyway, and to make a point in his New York argument he sends fifty strike-breaking buses to Newark, out of his own State where there are no votes to be swung against him and so he sacrifices us, as good union men as ever he was, to his New York ambitions.

This expression of lament is reported to have come from another former railway employee:

> We thought we were striking for ourselves. I'm beginning to think we have been striking for the benefit of the bus owners and the bus drivers. So far as our interests are concerned they are just as effectively strikebreakers as though they were on car platforms. They are not union men. The nickels out of which our wages were paid are going to the bus owners and the bus drivers are getting the wages.

Strike Threat Again in Chicago

Another threat of a street car strike in Chicago bobbed up this week. Laborers and mechanics employed by the Chicago Surface Lines threatened to walk out unless they were granted more than the 3 cents an hour increase offered by the company. Conferences between the company officials and international union officials were being held when this issue of the ELECTRIC RAILWAY JOURNAL went to press, in an effort to reach a settlement. Union officials are said, however, to have agreed not to strike until Mayor Dever returns from a vacation of ten days.

Assurance was given late in the week that motormen and conductors would not support the shopmen and other employees in case of a strike. William Quinlan, president of the street car men, who have accepted an increase of 3 cents an hour said, "Our men will operate the street cars. We have to live up to our contract."

News Notes

Checks for Safety Records Distributed.—Bonus checks totaling $188 were distributed to trainmen of the Wisconsin Public Service Corporation, Green Bay, in appreciation of their work in avoiding accidents during the second quarter of the year. Twenty-six men had no accidents.

Will Talk Railways Over Radio. — Harry L. Brown, editor of ELECTRIC RAILWAY JOURNAL, is scheduled to talk on Saturday evening, Aug. 11, from 7:45 to 8 p.m. from WJZ, Aeolian Hall, New York, to a radio audience. His subject will be: "Is the Electric Railway a Back Number and Can the Bus Replace It?"

Opawa News Appears.—The Steubenville, East Liverpool & Beaver Valley Traction Company, East Liverpool, Ohio, started in July the publication of a pamphlet entitled *The Opawa News*. Number 1 of Vol. I gives a talk to the employees on loyalty and tells about the company's policy and management with respect to supplying service to the public.

$940,000 Paid in Benefits.—The Employees' Benefit Association of the Brooklyn Rapid Transit Company was twenty-one years old on June 1 last. In this period from June 1, 1902, to May 31, 1923, inclusive, association members and their designated beneficiaries have received a total of $940,875 in sick and death benefits.

Resolution Advocates Public Ownership.—Public ownership of all public utilities in the state was advocated in a resolution adopted at the annual meeting of the Municipal League of Georgia, held recently in Atlanta. The league is composed of city and town officials throughout the state, and other persons interested in the policies for which the league stands.

Hearing Adjourned.—The Public Service Commission on July 24 adjourned until sometime after Sept. 10, to consider Mayor Akin's complaint against the Fonda, Johnstown & Gloversville Railroad, asking that it be compelled to fulfill a franchise obligation to extend the Amsterdam trolley line into the southern part of that city. The adjournment was at the joint request of Corporation Counsel Fitzjames, representing the city and Wesley Maider of Gloversville representing the railroad.

Approval Almost Unanimous. — The signatures of 99.9 per cent of all the employees of the Philadelphia Rapid Transit Company were submitted as indicating their approval to the protecting of the co-operative wage dividend. The one-tenth of 1 per cent who did not sign are conscientious objectors, principally members of those religous cults which consider participation in co-operative activities as expressing doubt in their church. Thomas E. Mitten expressed satisfaction over the approval of the employees and in writing to President Nyman said that the readiness with which the employees signed over their wage to insure the continued purchase of the company's stock as originally planned, denoted a settled purpose and a recognition of responsibility which was most encouraging.

Boston Men Get Increase.—An increase of 3⅓ cents an hour, or approximately 6 per cent over the old basic scale in effect, was awarded to the employees of the Eastern Massachusetts Street Railway on Aug. 1. The award was made by Henry C. Attwill, Chairman of the State Department of Public Utilities, as the neutral member and Chairman of an arbitration board. Fred A. Cummings, representing the Public Trustees of the road, concurred in the report and James H. Vahey, representing the employes, dissented. About 3,000 men are affected. The award is retroactive to May 2, and will be in effect until May 1, 1924.

Approves Vote on Municipal Ownership.—Councilman John Hirschberg recently appeared before the Council committee on ordinances to advocate a resolution providing for a special election to pass upon the question of municipal ownership of railway lines in Richmond, Va. After considerable discussion it was determined to table the resolution until "facts and figures" could be presented by Mr. Hirschberg, who promised to have them at an early date. Mr. Hirschberg said that he did not know whether municipal ownership would be a good thing, but that he wanted the people to have the opportunity to express themselves at the polls at this subject.

Seeks Franchise Extension. — The Portland Railway, Light & Power Company, has applied to the City Council of Vancouver, Wash., for a fifty-year extension of its franchise in that city. The company plans to spend $80,000 in improvements there within the next three years. The ordinance extending the franchise will come up for final passage on Aug. 8, before the City Council. One of the provisions of the extension ordinance provides for the repeal of the one which gave J. R. Harvey the power and light franchise in Vancouver many years ago. The Portland Railway, Light & Power Company took over Mr. Harvey's franchise, and is now furnishing both power and light to Vancouver.

Employees Have Outing.—The Connecticut Company employees held their annual outing at Momauguin, New Haven, on July 26. Special cars left New Haven at 9:15 a.m. and upon arrival at the shore, the preliminary baseball games were played. Clam chowder was served at 11:30 a.m. and then the field sports took place. Later 386 Connecticut Company men and guests sat down to an old-fashioned sheep roast, served out of doors on long tables, with plenty of other good things to go with it. After dinner the winners of the preliminary ball games played for the Connecticut Company championship. It resulted in New Haven taking the prize with a score of 13 against 1 for Hartford. This ended the events at the 1923 outing. The Connecticut Company band furnished a fine program of music. It made a hit with the new uniforms.

Operation By City Resumed.—The city of Amarillo, Tex., has again resumed operation of its street railway. The line has been operated by the city under lease from the owners for the last three years because the owners, unable to pay operating costs, proposed junking the property. The city recently gave notice that it did not care to renew the lease. The owners also signified their intention of not attempting to operate the property and it appeared that the city would be without car facilities. Property owners and business men then stepped into the breach and a compromise was reached by which the city will continue operating the property, charging a 5-cent fare instead of 10 cents. The result is that business is picking up and it appears that the property can be made to pay operating costs.

Rejects Company's Proposal. — The strike committee representing the members of International Brotherhood of Electrical Workers, who several weeks ago declared a strike against the Monongahela West Penn Public Service Company, Fairmont, W. Va., at the expiration of a contract agreement, has announced that it has rejected the latest proposal of the company made on July 20. One of the principal features of the proposed agreement suggested by the traction company to which the strike committee objected was an arbitration agreement with a non-strike clause. The chairman of the strike committee in a statement said that the union was willing to submit an arbitration proposal that would be so braced as practically to make the non-strike provision unnecessary, but that it should be in the agreement as a last resort.

Talk of an Important Canadian-American Line.—Reports from Aroostook, Me., say that negotiations between the Canadian Government Railway and Arthur R. Gould, president of the Aroostook Valley Railroad, have reached a point which makes the proposed Quebec extension electric line across the northern part of this state seem a practical certainty. The project is to connect the two roads by a line between Washburn and La Fontaine, Que. Mr. Gould and his associates are to build a railroad from Washburn to a point on the Quebec border above Ludwig Pond, while the Canadian road will construct a branch from La Fontaine to this point. The American line will be 100 miles in length and the Canadian about 20. The approximate cost of the construction may reach $4,000,000 at present-day figures. The Aroostook Valley line, of which Mr. Gould is the head, is a 40-mile electric road.

Foreign News

Safety Glass Car Windows

The motormen's compartments on the new cars for the London Underground Railways will be fitted with "triplex" glass windows, which glass is claimed to be unsplinterable. Thus in case of the windows being smashed through collision or any other cause, the risk of injury through flying splinters of glass is eliminated. There are two sheets of glass with a thin sheet of transparent celluloid between.

Car Building Municipalities

Declining to follow the lead of some British municipalities, the Edinburgh Town Council has accepted the decision of its tramways committee not to enter into municipal trading by building its own tramcars. The town clerk, who was consulted on the legal aspect of the question, said that there was a direct prohibition against the Council's manufacturing motor omnibuses, but there was no such prohibition in regard to tramcars. Building cars, he pointed out, was different from repairs and reconstruction. The Council agreed to invite tenders for eight additional cars.

Coolness on Underground Railways

During the tropical heat which began in London in July attention was again directed to the coolness of the atmosphere on the deep-level tube railways of the metropolis. When the maximum shade temperature out-of-doors ranges round about 90 deg. F., the drop to about 60 deg. experienced on taking a tube train is very noticeable. The temperature in these deep tunnels is about 60 deg. all the year round, no matter how hot or how cold it may be outside. Powerful ventilating fans and ozonizing apparatus are constantly at work. On all these railways about 30,000,000 cu.ft. of air are drawn in daily, and of course a similar quantity ejected. On the other hand during hard frost in wintertime, entering a tube railway feels like going into a warm room.

Maintenance of Permanent Way in Britain

The subject of the cost of maintaining tramway permanent way has been considered by the Council of the Municipal Tramways Association, with special reference to its bearing on the relation of municipalities to the Roads Fund (a national fund derived from automobile vehicle taxation), and the financial consequences of grants in aid in respect of track maintenance. The Council came to the opinion that such a scheme would have the effect of diminishing the total sum now receivable out of the Roads Fund by members of the Association as local authorities. It was accordingly resolved that the Association was not prepared to take any steps which would affect adversely the financial position as a whole of local authorities, and that therefore the subject be not further pursued.

London to Southend Electrification

In the House of Commons, on June 14, a promise was given as to the electrification of the London, Midland & Scottish Railway's line from London to Southend-on-Sea, Essex, a distance of about 40 miles. Parliamentary authority for the work was obtained in 1912 but owing to the war and other causes nothing has been done. The railway has a bill for various purposes now before Parliament, and it came on for second reading on June 14. Threatened opposition to it was withdrawn on a statement being made that as soon as the board of the amalgamated company was constituted it would address itself to the problems involved, and endeavor to bring a satisfactory scheme to maturity at the earliest possible moment. Before the railway amalgamations which came into force on Jan. 1 last the London to Southend line belonged to the Midland Railway, which is one of the companies absorbed in the London, Midland & Scottish Railway.

Automatic Ticket Machines on London Railways

With a view to accelerating the booking of passengers during the rush hours, at Victoria Station, (District Railway, London), the underground companies a short time ago placed a "battery" of twelve ticket machines in the circulating area as an auxiliary to the usual booking office facilities. These machines are now issuing tickets at the rate of 2,500,000 per annum or approximately 30 per cent of the total bookings at this station. In booking halls of restricted size it is of great importance that quick booking facilities should be provided. It is impracticable to add to the size of the booking offices, but ticket machines overcome this difficulty and the public appear to appreciate this method of getting their tickets. The success of the scheme at Victoria has led to the establishment of similar "batteries" at Waterloo, Elephant, Bank and Mansion House and a further batch of fifty now on order will provide the same facilities at Westminster, Paddington, Liverpool Street and Leicester Square in the future.

Consideration is being given to equipping a warning bell to be rung in the booking office when the stocks of tickets are running low. An electrical device now fitted causes the machines to reject passengers' money if they are out of order.

An interesting feature in connec with the Victoria Station batteries shortly be introduced when the m front of one of the machines wil replaced by plate glass, thus reveal to the passenger the clever mecha of these electric machines and enab him to watch the progress of his from the moment of inserting it the slot until the delivery of the tic

Whilst these improvements are be made, the rate of ticket issues from booking offices also has been spee up by the provision of "rolltic and au maticket" machines, of which fifty- have now been installed at the bu traffic centers. Recent rush period have shown that both types of machi have an output of well over 1,000 tic an hour, this including the giving change. In both machines the tick are kept in rolls of 1,000, which a easily replaced, thus saving prec seconds and speeding the passeng journey from booking hall to platf

Recent Orders for Railway Equipment

The Lombardy Electric Traction Co pany, operating in the City of Mi Italy, has ordered from the Milano M chanical Works, formerly Miani, Silv tri & Company, twelve double-truck steel electric trailer cars to be 7 ft. wide, about 48 ft. long and to we approximately 10½ tons. These cars be equipped with red plush se bronze trimmings, etc. They wil used in the company's interurban ited service between Milan and M Twelve composite steel and wood m cars ordered from the Breda Lo tive & Car Works of Milan are nearing completion. These cars are ranged for "pay-within" operat They will be used for local runs on Milan-Gorla and other short one or zone suburban lines.

Plans Electrification

The Lombardy Road Railways, L formerly British owned, but now a p of the Milan Edison system, conte plates electrifying its Milan-Carate from Milan to Desio, Italy, 12 mi The financing of the scheme has arranged through the Milano & Lo bard Provinces Savings Bank with full approval of the Ministry of P Works (Railway and Transportation In spection Bureau). Another subsi of the Milan Edison Company, a for Belgian company known as the Inte provincial Tramways, is planning to tend its electrification on the M Crescenzago line to Cascina G (about 6 miles) in order that all t from its northern lines may enter M under electrical operation. Since April of this year a heavy four-w motor car (13 tons, 120 hp.) has equipped with Svenska Kullager Fa riks ball bearings, instead of jou brasses. This is the first serious ex periment of this kind in Italy and to date, seems to give satisfactor sults both in power and lubric saving.

Financial and Corporate

City's Expert Fixes Minneapolis Valuation at $11,000,000

Vol. 1 has been issued of the report by Delos F. Wilcox on the Minneapolis Street Railway appraisal. This volume includes the general conclusions of Mr. Wilcox and selected tables from the voluminous report filed on June 5 with the City Council and with the Railroad & Warehouse Commission of Minnesota. Mr. Wilcox terms the volume a "report upon the value of the street railway property of the Minneapolis Street Railway and the operating conditions and expenses of the company, based upon an inventory of the property as of Jan. 1, 1922; an investigation of the company's books, accounts and records, and an appraisal of the property as an operating system, all pursuant to the provision in chapter 278, laws of Minnesota, 1921, entitled 'An Act Relating to Street Railways.'"

In his summary of conclusions, Mr. Wilcox says that the actual cost new of the company's property, used, useful and reasonably necessary for street railway purposes within the city of Minneapolis, as of Jan. 1, 1922, the date of the inventory, was $15,939,918. The reproduction costs new of the property included in the inventory, based upon normal or historical unit costs, with 15 per cent allowed for general overhead expenses, was $17,457,362 according to Mr. Wilcox. He places the normal or historical reproduction costs new, less straight line depreciation, at $10,030,508. He recommends that the fair value for rate purposes of the company's street railway property used, useful and reasonably necessary for street railway purposes in the city of Minneapolis be fixed at $11,000,000 as of the date of the inventory. He further recommends that the annual rate of return to be allowed on the rate base be fixed at 6½ per cent. As he sees it, the annual return upon the investment, therefore, should be 6½ per cent on $11,000,000, or $715,000.

It is his opinion that the excess of the company's operating income for the year 1923, based upon proper adjustment of its 1922 income, over a reasonable return upon the fair value of the property of the company as determined by him, will be approximately $1,686,418. Since Aug. 16, 1920, the company has been charging a straight 6-cent fare with free transfers. Mr. Wilcox recommends that the rate of fare be fixed at 5 cents with free transfers. According to his estimate, this gives the company a leeway for surplus and reserve of $355,170 over and above a reasonable return on its investment. He says that even if it should be held that the value of the leases there must be included, the method of valuation used by Cappelen, Pillsbury and A. L. Drum & Company is fundamentally unsound.

Mr. Wilcox says that the principal difficulties arising with respect to the inventory, aside from the difficulties always incurred in making an accurate description of a complex property such as a street railway system, were the result of differences in theory as to the propriety of excluding or including certain items in the list of used and useful property and differences arising with respect to the allocation of jointly-owned property.

Net Income Decreases in Detroit

The earnings of the Department of Street Railways in Detroit, in June were $62,139. Although the revenue from transportation increased there was also an increase in operating expenses. The total revenue from transportation was $1,694,664. This was in excess of the revenue for June, 1922, but the net profit was cut down by decreases in rentals and increased costs of operation.

To meet increased traffic demands the department furnished 507,347 additional car-miles. Miles operated last month were 4,371,504 as compared with 3,864,157 in June a year ago. The cost of operating each car per mile increased from 28 cents to 30.42 cents. This increase is reported as being principally due to the higher wages paid the employees. The number of passengers carried in June was 41,730,246, as compared with 36,715,466 in June, 1922.

In order to meet principal and interest on notes payable, sinking fund and interest charges and bond requirements, the sum of $353,532 was set aside during the month.

Jersey Central Traction Suspends

Service on the 40 miles of track of the Jersey Central Traction Company was suspended at midnight, July 28, the necessary approval of the Public Utility Commission having been granted earlier in the month. The Jersey Central line served about 30,000 people in the Perth Amboy-Atlantic Highlands district of New Jersey. A steady decrease in patronage and the resultant loss of money were given as the cause for suspension. An account of the hearing on the company's application for permission to discontinue, appeared in the ELECTRIC RAILWAY JOURNAL for July 7, page 33, July 21, page 116.

Jitney buses have been serving the district since July 28. Under the state laws, no certificate of convenience is necessary for owners of buses operating along streets where there is no trolley track. It has been assumed that no certificate is necessary for operation along the tracks of the defunct railway, so there is no way of determining the number of buses serving the district, but the present service by the buses is said to be adequate.

Reproduction Cost Not the Controlling Factor

Reproduction cost of public utility properties in Wisconsin cannot be considered as the controlling factor or even as a considerable factor in fixing the valuation of such properties for rate-making purposes by the State Railroad Commission. Judge M. B. Rosenberry of the Wisconsin Supreme Court has so held in the case of the Waukesha Gas & Electric Company against the Railroad Commission of Wisconsin. His decision upholds the power of the commission to fix rates for public utilities and justifies the commission in disregarding to a large extent the claim of replacement values made by utility companies in resisting demands for lower rates.

The decision by the State Supreme Court was rendered in affirming the recent decision of the Circuit Court of Dane County which restrained the company from increasing its electric rates on the basis of a revised valuation of its properties. The latest ruling is regarded as practically stabilizing the valuation of utility companies for rate-making purposes and doing away with expensive revaluations and rate hearings.

The court points out that the United States Supreme Court, in three cases decided in May and June of this year, has not entirely clarified the situation as none of them contains a statement as to what weight should be accorded to the cost of reproduction new, less depreciation. One of these was the Southwestern Bell Telephone Company case from Missouri, which was interpreted at the time as upholding the reproduction cost theory of valuation.

Stating that it does not attempt to lay down a formula for valuing public utilities, the Wisconsin court says if it were to accord rank to the various factors to be considered in accordance with the weight to be given each in determining present fair value for establishing a rate base, such formula would be this:

1. Actual cost of plant when the investment has been prudently made.
2. Under normal conditions, cost of reproduction new, less depreciation. (When conditions are abnormal, cost of reproduction new, less depreciation, should be fourth.)
3. Going concern value.
4. Working capital.
5. Other elements of value which may be presented in a particular case.

Seeks Approval of Seneca Lake Abandonment

The Elmira, Water, Light & Railroad Company, Elmira, N. Y., recently applied to the Public Service Commission for approval of a declaration of abandonment of its Seneca Lake division, running from Horseheads through Veteran, Montour and Dix. The railroad says that although every expedient known to the management has been tried to increase the gross revenue, the revenue has not been sufficient to pay operating expenses, and that to keep it in operation under present conditions was unfair to the security holders.

Receivership of Staten Island Line Lifted

John J. Kuhn, receiver for the Richmond Light & Railroad Company, Staten Island, N. Y., for the last three years, was discharged on July 31 when the receivership was ended by United States District Court Judge Edward L. Garvan. The court acted on the application of the Staten Island Edison Company and the Richmond Railroad, formed to take over the Richmond Light & Railroad Company.

The latter company for years enjoyed a monopoly of street and commercial lighting on Staten Island, a large proportion of the stock in the company being owned by H. H. Rogers. Upon his death the interest passed to his estate. The company long carried on a profitable business in commercial lighting, but during the war-time period it became impossible to operate the railway profitably at a 5-cent fare.

The directors of the company applied to the New York city administration for permission to increase fares to 8 cents and were met with a flat refusal. On April 28, 1920, a receiver was appointed on the application of the Westinghouse Electric & Manufacturing Company, one of the creditors.

Later Judge Chatfield, in Brooklyn, granted an 8-cent fare. Since that time, it was said, the railway has been operated upon a profitable basis.

On Oct. 8, 1922, the J. G. White Management Company purchased the interest in the company held by the estate of H. H. Rogers. As pointed out in the ELECTRIC RAILWAY JOURNAL for July 28 the White interests organized and incorporated the Staten Island Edison Company and the Richmond Railroad. It was upon the application of the White Company to the court that the receivership was discharged. J. H. Pardee is president of both companies, which for the most part retain the personnel of the Richmond Light & Railroad Company.

Miami Traction Company Dissolves

The Miami Traction Company organized about nine years ago by the Tatum interests, recently passed out of existence by the signing of an order by Judge Atkinson in the Circuit Court. The Tatum interests built the present car system of Miami.

The company operated for several years with storage battery cars. It was unable to compete with jitneys and when the company's carhouses were destroyed by fire, service was suspended. Afterward, the tracks were purchased by the city of Miami, and a lease was signed between the city and the Miami Beach Electric Company, organized by Carl G. Fisher, to furnish street car service between Miami and Miami Beach and at Miami Beach, whereby that company was to operate the city's lines.

Several weeks ago a petition was filed by the Miami Traction Company, asking permission to dissolve the corporation on the ground that it was no longer in business. It was on this petition that Judge Atkinson acted when he signed a decree dissolving the Miami Traction Company as a corporation.

$259,526 Surplus for Northern States Power

The report of Northern States Power Company, Chicago, Ill., for the year ended Dec. 31, 1922, shows net income of $2,594,660, after taxes, interest, depreciation, amortization, etc., eqquivalent after preferred dividends to $12.20 a share earned on the $6,170,000 outstanding common stock. This compares with $2,111,861, or $8.27 a share on common.. The consolidated income account for 1922 compares as follows:

	1922	1921
Gross receipts	$13,881,919	$12,963,922
Net after taxes	5,781,092	5,207,543
Interest	2,311,432	2,295,682
Depreciation, etc	875,000	800,000
Balance	$2,594,660	$2,111,861
Preferred dividends	1,841,534	1,601,164
Common dividends	493,600	246,800
Surplus	$259,526	$263,897

Quebec Power Announces Terms of Merger With Railway

Following a joint meeting of the directors of the Quebec Railway, Light, Heat & Power Company and the Quebec Power Company the directors of the former company sent a letter to the shareholders advising them that their best interests would be served by their acceptance of the offer of the Quebec Power Company. Secretary Wilson in announcing to their Quebec Railway shareholders the directors' unanimous decision stated that it was evident that only through such co-ordination of interests and the grouping together of the power resources of the two companies could the necessary economies of operation be brought about.

To the holders of the common shares of the Quebec Railway the following offer was made:

> Quebec Power Company will purchase and acquire the whole or any part of the common shares of the Quebec Railway, Light, Heat & Power Company, Limited, of an aggregate par value of $10,000,000 by giving in exchange therefor common shares of Quebec Power Company of the par value of $100 each on the basis of $25 par value of such common shares for each $100 par value of the common shares of Quebec Railway, Light, Heat & Power Company, Limited. The common shares so offered in exchange form a part of an authorized issue of $6,000,000, of which $1,600,000 have been issued and are presently outstanding.

To the holders of the 5 per cent thirty-year income bonds of the Quebec Railway the offer was as follows:

> Quebec Power Company will purchase and acquire the whole or any part of the income bonds of the Quebec Railway, Light, Heat & Power Company, Limited, of the issue above mentioned, by giving in exchange therefor 7 per cent preference shares of the par value of $100 each of Quebec Power Company on the basis of $30 par value of such preference shares for each $100 par value of such income bonds. The preference shares so offered in exchange form part of an authorized issue of $4,000,000, of which $1,410,000 have been issued and are presently outstanding. Or, at the option of the holder, the Quebec Power Company will pay $27 in cash for each $100 par value of such income bonds.

Financial Authority Optimistic About Grand Rapids

Dividend prospects of the Grand Rapids Railway appear to be good, according to the *Wall Street Journal*. That paper says that while no official statement has been made regarding payment of back dividends, it is expected that some plan beneficial to stockholders will be worked out after arrangements are completed to refund the $2,500,000 first 6s and $1,200,000 general 6s outstanding. Only the first 6s are in the hands of the public. These latter are selling in unlisted securities market around 99½, to yield 6.50 at maturity. The stock is quoted at the present time at $38 a share.

As indicated in the ELECTRIC RAILWAY JOURNAL for July 28 the company in June ran slightly behind the 8 per cent return guaranteed to it under the terms of the recently revised franchise, but the *Wall Street Journal* says that the net earnings for twelve months ended May 31, 1923, were $553,962, the largest for any corresponding period since the company's organization in 1900. While its gross revenues during the five-year period noted showed improvement from year to year, conditions imposed by the war and the post-war periods made heavy inroads on net income and deficits after depreciation continued to pile up until 1922, when the road was able to show net profits a little in excess of $6,000.

The company's original franchise expired in April, 1921. An agreement was then made with the city by which lines continued to operate and experiments were made with various rates of fare to note their effect upon traffic and a fair return to company. The result of these experiments was that in April, 1922, a service-at-cost franchise was agreed upon between city and company. The voters ratified this grant in September, 1922, effective at once. It provided for initial valuation for rate-making purposes of $5,500,000, plus cost of additions from time to time, and for a graduated rate of return depending on fare charged. Initial return was fixed at 8 per cent with 10-cent cash fares, or seven tickets for 50 cents and free transfers. During nine months subsequent to September, 1922, company came within $15,000 of earning full return to which it was entitled. Jitney competition has been eliminated by agreement, giving the company an opportunity to develop its own system, and it has recently installed six buses of the Fifth Avenue coach type to reach parts of the city not covered by car lines.

The Grand Rapids Railway is a subsidiary of the Commonwealth Power, Railway & Light Company. All the common stock of the Grand Rapids company and $500,000 of $2,000,000 of 5 per cent preferred is owned by Commonwealth company. Dividends were paid on preferred from 1900 to November, 1918. Since then there have been accumulated dividends aggregating 23 per cent.

Wage Increase and Heavy Maintenance Bring Expenses Above Revenue

A decline in passenger travel and a marked increase in operating expenses due to high maintenance layout and increased wages brought a deficit of $26,748 in the operations of the Community Traction Company, at Toledo in June, according to the report of the Street Railway Commissioner to the board of control at its meeting on July 18.

The 10 per cent wage increase to all employees and the maintenance program, which has increased the force of workmen by about 100 men, boosted the payroll expense about $34,000 over June last year.

Additional maintenance funds set up amounted to $20,000 for a total of $60,000 and the expenditures during the month reached more than $72,000 for the highest maintenance for one month in the history of the company.

Operating costs resulted in a ratio of operating expense to gross income reaching the high figure of 80.57 per cent. The commissioner commented on this by saying that to break even an operating ratio of not more than 70 per cent should be maintained.

Riding has decreased from an average of 187,539 revenue passengers a day in March to 172,467 in June and present indications are that the average for July will not exceed 168,000. The increased use of private automobiles is the reason given for the big drop in summer.

Bus feeders continued to fail to break even, although the Oak Street line showed a slight betterment.

Hudson & Manhattan Making Good Record

The declaration of the initial 2½ per cent dividend on the preferred stock of the Hudson & Manhattan Railroad, New York, referred to briefly in the ELECTRIC RAILWAY JOURNAL for July 28, page 158, has attracted much attention in railway and financial circles. The position of the company with respect to earnings has been improving over a long period now. The *Evening Sun* recently stated the matter as follows:

> This is the first disbursement on the issue since the company's consolidation with the New York & New Jersey Railroad in 1906. The issue is non-cumulative. During the world war the company was permitted to increase its fares by the Interstate Commerce Commission, and earnings at the present time are double those of 1916. Much of the increase is accounted for in the movement of New York city residents to own homes in New Jersey. At the same time operating expenses were kept at a minimum
>
> In 1913 the capitalization was readjusted with an assessment of $8.50 on each common and preferred share. In April of this year the company cleared up its back interest payments on the 5 per cent adjustment income bonds. This action paved the way for the declaration of the dividend.
>
> The June report reflects the company's improvement. Surplus, after full adjustment on the income 5s, was given as $90,524, as compared with $29,372 in the same month last year. For the first half of the current year surplus after all charges amounted to $600,426, against $407,968 in 1922. A majority of the common stock is owned by the Hudson Companies.

Net Income Increases.—The net income of the Twin City Rapid Transit Company and subsidiaries for the first six months of 1923 was $929,075 against $793,870 for the same period a year ago.

Sale Held. — The bondholders' committee bid in the Portsmouth, Dover & York Street Railway, Portsmouth, N. H., at a sale in Boston on June 30. The trustee under the indenture securing the bonds is the State Street Trust Company of Boston.

Railway Service to Be Continued.—Railway service will be continued in Waupaca, Wis., following the vote of the City Council which was seven to one in favor of keeping the service furnished by the Waupaca Electric Service & Railway Company. A controversy had existed between the company and the city over paving of the company's track zone on Fulton Street.

New Issues Explained. — William Hughes Clarke, investment bonds and stocks, Chicago, has prepared a bulletin presenting the divisional earnings of the separate companies of the Chicago Elevated Railways, which will be of interest to holders of the old elevated securities. The new issues proposed in the reorganization are also explained in the bulletin.

Increase in Net Income.—The Brooklyn City Railroad, Brooklyn, New York, for the year ending June 30, 1923, reports a passenger revenue of $11,715,964 against $11,413,651 for the year ending June 30, 1922. The net corporate income for the year ended June 30, 1923, was $2,256,025. For the year ended June 30, 1922, the net corporate income was $1,765,528.

Auction Sales in New York.—At the public auction rooms of A. H. Muller & Sons on Aug. 1 there were sold $4,000 of Southwestern Gas & Electric Company general 6 per cent bonds, due 1957, interest May and November, 77¼ per cent; and $2,000 of the Union Traction Company of Indiana first general 6 per cent bonds, due 1932, interest January and July, 64¾ per cent.

Balance Shows Increase.—The net earnings of the Virginia Railway & Power Company for the first six months of the year were $1,953,840, against $1,431,295 for the same period in 1922. After consideration of the depreciation and renewal reserve, the balance for the first six months of the current year was $686,017, an increase of $499,885 over the period from January to June, 1922.

Two-Year Notes Offered.—Stone & Webster are offering $1,000,000 of the Savannah Electric & Power Company's two year 6½ per cent gold notes at 99½ and interest, to yield 6¾ per cent. The notes are dated July 2, 1923, and mature July 1, 1925. The Public Service Commission of Georgia has approved this issue of $1,000,000 notes to provide funds for the purchase of the property formerly owned by the Savannah Lighting Company, which has done a portion of the electric lighting and power business in Savannah. The unified operation of the properties will furnish better service to customers and permit substantial economies.

Surplus Earnings Increase. — The United Light & Railways Company, Grand Rapids, Mich., for the twelve months ended June 30, 1923, reports gross earnings of $12,400,250 against $11,243,413 for the same period a year ago. The surplus earnings available for depreciation, debt discount and common stock dividends was $1,235,545 for the year ending June 30, 1923, which represented an increase of $298,895 over the surplus earnings for the year ending June 30, 1922.

Offer Gold Bonds.—Halsey, Stuart & Company, Inc., are offering at 91½ and interest, yielding about 6.70 per cent, $7,192,000 of Interstate Public Service Company first mortgage and refunding 6 per cent gold bonds, known as series "A." The bonds are due Feb. 1, 1948. The company, of which Harry Reid is president, comprises 24 miles of electric railway, and 122 miles of interurban lines, with modern switching, signalling and substation equipment. The interurban line from Seymour to Indianapolis is operated under a 999-year lease, completing the line from Indianapolis to Louisville, reaching more than 750,000 people. The proceeds from the sale of these bonds will be used for refunding purposes and for other corporate uses.

Sporting Arena to Replace Carhouse.—Tex Rickard, John Ringling and associates, under the name of the New Madison Square Garden Corporation, expect to acquire title to nearly the whole block at Fiftieth Street and Seventh Avenue, New York, now occupied by the carhouse of the Broadway & Seventh Avenue Railroad, included in the New York Railways, to build the "largest indoor arena in the world." The contention of the minority stockholders is that the price to be paid for the site is sufficient for the Broadway & Seventh Avenue Railroad to make a profit for its shareholders if the company can be separated from the New York Railways. They have sought the advice of the court on the matter.

Freight Business Increases.—A decrease in passenger traffic revenue and increase in income from freight business is recorded in the report of the Indiana, Columbus & Eastern Traction Company, for the first five months of 1923. The report was made public on June 30 at the company's headquarters in Springfield, Ohio. The report shows that while the average mileage was 4 per cent greater than for the same period in 1922, there was considerable greater decrease in the volume of passenger business. This was attributed in the company's report to competitive bus lines. Nearly 100 per cent increase was noted in the freight business for the period over the corresponding five months in 1922. This, the company believes, was due both to a betterment of industrial conditions general in Ohio, and to the campaign which has been conducted among shippers to route their shipments over the traction line.

Traffic and Transportation

Guards Hear What To Do in Emergency

A circular entitled "What Interborough employees are to do when an accident occurs on the subway" was recently issued by Frank Hedley, president and general manager of the Interborough, and distributed among the employees. Complaints have been sent to the subway management as the result of failure on the part of the employees to follow out strictly the rules "adopted for their guidance in emergency cases." Accordingly, Mr. Hedley said the circular was prepared for ready reference to some of the more important rules in emergency cases.

The employees are first of all reminded that the safety of passengers is the first consideration and that the understanding of the emergency control devices and the emergency alarm system is absolutely essential.

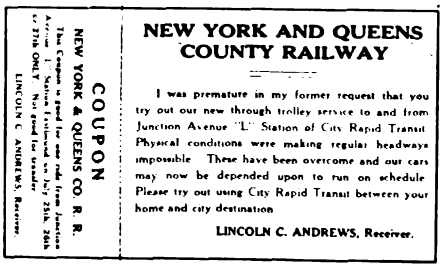
Besides the handling of the car the employees (conductors and guards) must also know how to take care of the passengers. Mr. Hedley says that in the event of a blockade passengers will want to know "What is the matter?" and "How long are we likely to be detained?" These questions must be answered at once according to company rules, and if the guard is without facts he must secure the information as soon as possible (by telephone from trainmaster or the nearest dispatcher). Copies of the circular of instructions to the employees were sent to the metropolitan newspapers which published extracts from it. In this way it was brought forcefully to the attention of the riding public just what information it might expect in the future whenever an emergency arose in connection with the operation of the transit lines under the management of the Interborough.

Buses in the Plan for Better Service in Greensboro

According to R. J. Hole, second vice-president and general manager of the North Carolina Public Service Company, Greensboro, his company contemplates installing buses to certain sections not touched by the railway line. This decision was reached after Mr. Hole had received an engineering report from an independent authority on the traffic situation in Greensboro, and after Mr. Hole had made a personal study of the matter to ascertain what success the gasoline buses are having. As a result of his investigation Mr. Hole feels that it is well worth the time and money of the company to install the buses, and he accordingly informed the director of the road of his plans. The plans now contemplated call for an expenditure of $50,000. The cost of the buses is estimated at $8,000 each. In addition to the bus plan, the company expects to better its railway service. Just now the grade crossing problem makes it practically impossible to keep cars close to the schedules.

Offers Sample Rides to Patrons

A sample ride is the latest stunt of the New York & Queens County Railway. On the assumption that a trial ride will be so good that you'll want more, Receiver Lincoln C. Andrews recently sent the accompanying postcard to approximately 6,000 residents of the communities affected by the through trolley service from the Corona Elevated line to Flushing, College Point and Jamaica with a coupon attached "good for one ride from Junction Avenue 'L' station eastbound on July 25, 26 or 27 only. Not good for transfer." In addressing the residents General Andrews stated that he had been premature in his former request urging a try-out of the new through trolley service as physical conditions had made regular headways impossible. But since these difficulties were overcome and hence cars could be depended upon to run on schedule, he was asking for a tryout of the service.



COUPON

NEW YORK & QUEENS CO. R. R.

This Coupon is good for one ride from Junction Avenue "L" Station Eastbound on July 25th, 26th or 27th ONLY. Not good for transfer.

LINCOLN C. ANDREWS, Receiver.

NEW YORK AND QUEENS COUNTY RAILWAY

I was premature in my former request that you try out our new through trolley service to and from Junction Avenue "L" Station of City Rapid Transit. Physical conditions were making regular headways impossible. These have been overcome and our cars may now be depended upon to run on schedule. Please try out using City Rapid Transit between your home and city destination.

LINCOLN C. ANDREWS, Receiver.

Invitation to Ride Free Sent to Patrons

The reaction from the postcard was very good, some suggestions coming in from patrons which showed a very friendly spirit and indicating that they would be glad to use the service if it was made dependable—a condition which has not prevailed in the past but which the General is making a determined effort to correct.

Houston Fare Issue Postponed

The hearing on the Houston Electric Company's petition for an increase in fare from 6¼ cents to 9 cents has been postponed until Sept. 24. The extension has been granted to enable the company to revise its depreciation figures and to enable the city to study the valuation claims of the company.

The fare is now 7 cents cash with a ticket rate of four for 25 cents. The number of jitneys operating at present has been limited to 150, being reduced about a year ago from 300. They largely duplicate the car service except to Harrisburg where a 10-cent fare is charged on the jitneys, and they operate one half mile beyond the end of the car line. A recent referendum election voted the continuance of the jitney operation.

John A. Beeler has been engaged by the city of Houston to make a traffic routing and operating survey in order to determine the extent and value of all practical operating economies. He will also investigate the jitney situation in the city.

Jitney Hearing Set for Aug. 4

The question of whether jitneys are operating in Schenectady legally or illegally remains deadlocked because of the reluctance of Supreme Court Justice Henry V. Borst of Amsterdam to entertain a motion which would lead to a decision as to the legal status of the jitney injunction. The entire question will be held in abeyance at least until Aug. 4, to which time the hearing held before Justice Borst on July 28 was adjourned. Meanwhile jitneys are operating with renewed vigor.

The Schenectady Railway sought in special term before Justice Borst to have the order of County Judge John J. McMullen of Schenectady vacating the injunction of Justice Angell restraining jitney operation set aside on the ground that the county judge was without authority to issue such order.

Justice Borst shifted the responsibility, claiming it was a matter in which Justice Edward M. Angell of Glens Falls should have jurisdiction because it was Judge Angell who issued the original injunction at the request of the Schenectady Railway restraining the jitneys.

The legality of the vacating order seems from the course the argument took to hinge largely upon whether the vacating order was that of the county court or of the county judge.

Judge Naylor, who appeared for the railway contended that it was a county court order and as such was improperly issued, in that the county court was without jurisdiction. Asked as to whether the vacating order would be legal if construed as an order of the county judge, Judge Naylor said that the company would not admit this, holding that the action of Judge McMullen in vacating the order was not proper in any circumstance.

Judge Borst, following the discussion, said that inasmuch as it was a matter which intimately concerned Justice Angell, he would prefer the question be heard and passed upon by Justice Angell. He explained that a supreme court judge did not make a practice of passing upon an order either vacating, amending or interfering in any way with such an order of another justice of the supreme court.

It is an interesting situation. If Justice Angell decides the matter, the possibility exists that as an outcome County Judge McMullen would be declared in contempt and this is the situation which apparently the justices do not wish to entertain.

New Traffic Regulations in Effect in Ohio

A new uniform state traffic code went into effect in Ohio on July 26. This code incorporates many of the provisions of the model traffic code of the American Electric Railway Association, and the incorporation of these provisions in the new Ohio code is due to the interest and activity of Paul E. Wilson, secretary of the Cleveland Railway. For example, the definition of the word "vehicle" in Ohio's new code is exactly that given by the model code of the A.E.R.A. Under Ohio's new code, all streets and roads used by electric railways are designated as main thoroughfares, and vehicles and street cars using such thoroughfares have the right-of-way over those going on intersections.

A few of the interesting section's of Ohio's new traffic code are:

Pedestrians shall not step into or upon a public road or highway without looking in both directions to see what is approaching. The penalty for infraction of this is a fine of between $25 and $100.

Vehicles shall keep to the right side of the road or highway except when necessary to turn to the left in crossing the road or highway or in overtaking and passing another vehicle; provided that in passing a vehicle going in the same direction, such passing shall be made as close to the right hand side of the road or highway as practical.

Before backing, drivers of vehicles shall give ample warning, and while backing, vigilance shall be exercised not to injure those behind.

Drivers of vehicles, before turning, stopping or changing their course, shall make sure such movement can be made in safety and shall cause signals to be made of their intention, in a way visible outside the vehicle.

The operator of a vehicle shall yield the right-of-way at the intersection of its path and the path of another vehicle to the vehicle approaching from the right.

Speed limits are fixed at 15 m.ph., in the business or closely built up portions of municipal corporations, 25 m.ph. in other portions of municipal corporations and 35 m.ph. outside of municipalities.

Motor vehicle drivers are subject to fines of between $10 and $100 for first offenses against the new traffic code, and for second offenses, fines of between $25 and $100. together with imprisonment for not more than ten days.

Bus Operators Will Go to Supreme Court

Jitney drivers in Fort Worth, and operators of motor buses and service cars carrying passengers between Dallas and Fort Worth, have joined issue with the city of Fort Worth in its effort to legislate these jitneys and motor bus lines out of business. The City Commission at Fort Worth recently passed an ordinance prohibiting the jitneys and inter-city service cars and motor buses from using any street in the down-town business district except Fourth Street. Traffic officers were placed on the Dallas-Fort Worth pike at the city limits to stop intercity service cars, and extra traffic officers were placed on duty downtown to keep jitneys and service cars off these streets.

The effect of this legislation, if enforced to the letter, would be to put the intercity service cars and buses operating between Dallas and Fort Worth out of business, as they would be unable to find an entrance into the city. The legislation would also put out of business those jitneys now operating from the business district to several outlying additions to the city not served by street car lines.

The jitney drivers and service car owners went into court as soon as the ordinance was passed and were granted a temporary injunction restraining the city of Fort Worth from enforcing the ordinance. This temporary order has been set for hearing and upon the outcome of that hearing depends the fate of the intercity jitneys and motor buses. The bus operators have declared that they will carry their fight to the Supreme Court if they lose in the state courts.

Dallas Railway Files Acceptance of Fare Extension

The Dallas Railway, as was reported in the ELECTRIC RAILWAY JOURNAL issue of July 28, recently filed its formal acceptance of the proposal made by the City Commission known as the Everman Plan No. 2, under which the city agreed to extend the 6-cent fare grant for eighteen months on condition that the traction company spend $705,915 during the eighteen months that the increased fare is in effect in extensions and betterments and in purchase of thirty new modern cars. The agreement constitutes a compromise between the city officials and the traction company and was negotiated by John W. Everman, supervisor of public utilities for the city. The increased fare grant extends to Dec. 27, 1924.

With the acceptance of the ordinance that had been passed several days previous by the City Commission, the traction problems involving the city of Dallas and the Dallas Railway are solved for a period of eighteen months, and officials of both city and traction company are going ahead planning for the expected development of the city during this time.

The new franchise grants an extension of the 6-cent fare to Dec. 27, 1924. The improvements and extensions will not be required until after the completion of improvements in the Everman plan No. 1, of last year, which gave the company eight months for completion of the program. Nor will the railway company be required to act on the Trinity Heights situation immediately, the agreement stipulating that the line must be taken over during the eighteen months.

Seeks Higher Fare in Ogdensburg

James E. Kelly, receiver of the Ogdensburg Street Railway, Ogdensburg, N. Y., on July 26, petitioned the Public Service Commission for authority to charge an 8-cent fare, strip tickets, five for 35 cents, and a 5-cent cash fare for school children under sixteen years, between 8 a.m. and 5 p.m. on school days.

The company's revenues in 1922, the receiver alleges, was $45,033. There was paid out by him in operating expenses $40,376 and in taxes $2,965, leaving $1,692.

Based on its operations in 1922 the receiver estimates that the proposed new fares, if allowed, will yield the company $54,000 or about $9,000 more than the amount received in fares in 1922.

Bus Line in New Castle.—A bus line is being operated by the Pennsylvania-Ohio Coach Lines Company, a subsidiary of the Pennsylvania-Ohio Electric Company, between the center of New Castle and Mahoningtown. This section was formerly served by the electric railway cars.

Bus May Replace Railway.—If the Public Service Commission authorizes the abandonment of the Seneca Lake division of the Elmira Water, Light & Railroad Company it is likely that a bus line will be started. It is expected that the trolley and bus petition hearings will be held on the same date.

Paying Damages. — The Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., started on July 30 paying some of the damage claim of the Malbone Street tunnel disaster which occurred in November, 1918. The claims amount to $2,200,000. Owing to the legal entanglements at least two weeks will be required to make the payments.

May Use Buses in Malden. — The Boston Elevated Railway is negotiating with the city government in Malden to put in a loop in that city as a terminus for its cars from the Everett terminal. In that case certain outlying tracks would be abandoned and a bus service substituted therefor. Should the proposed plan go through, about twenty-five buses will be required.

Regulation of Buses Rejected.—Regulation of motor buses by the Wisconsin Railroad Commission has been defeated in the Assembly. This bill if placed in effect would have given the commission power to determine the necessity for the operation of buses. Proponents of the bill said that it would protect the railways operating in the State. A bill containing similar provisions was vetoed by Governor Blaine two years ago.

College Men Employed by Railway.—Trainmen employed by the Dallas Railway are of a high class, according to C. J. Crampton, superintendent of safety and in charge of employment. Mr. Crampton recently addressed the Co-operative Club and took as the text of his address "Save the Difference." This is the slogan for the Dallas Railway. Many high school graduates and college men are employed as trainmen while attending school.

"Ad" Explains Broadway Bus Service.—In connection with the starting of its Broadway bus service whereby Broadway, Providence, is served by buses only for local service the United Electric Railways ran an "ad" in the *Evening Bulletin* explaining the conduct of the bus operation. The "ad" contained a picture of both the bus and electric car in the company's service. "The outstanding feature in explaining these changes," says the "ad," "is better service."

Personal Items

Mr. Griffin Made Vice-President of Texas Electric Railway

James P. Griffin, general passenger agent of the Texas Electric Railway, with headquarters at Dallas, has been elected vice-president of the company and a member of the board of directors. Mr. Griffin is the oldest member of the original Strickland organization in point of service.

He came to Dallas with the late Col. J. F. Strickland when preliminary organization of the Dallas-Sherman Interurban was undertaken in 1905. In 1906, when the road was incorporated, he was made secretary. When the road was completed and operation begun in 1908, he was made general passenger agent and auditor. On April 1, 1912, Mr. Griffin was made secretary of the Southern Traction Company, which was building the lines from Dallas to Waco and Dallas to Corsicana.

In October of that year he was appointed general passenger agent and auditor of those lines. When the Texas Electric Railway was organized in 1917, through the consolidation of the various Strickland interurban lines, Mr. Griffin became general passenger agent of the consolidated system and secretary of the company.

Mr. Griffin is now in his eighteenth year of service with the Strickland interurban companies.

C. P. Couch Vice-President of Holding Company

C. P. Couch, a member of the board of directors of the Arkansas Light & Power Company, has been made active vice-president of the Mississippi Power & Light Company, operating public utilities at Jackson, Vicksburg, Greenville and Columbus, Miss. He had been manager of the Arkadelphia-Malvern district of the Arkansas Light & Power Company. The Mississippi Power & Light Company with which he has become identified with headquarters at Jackson, Miss., was organized recently following the acquisition by H. C. Couch, J. L. Longino and their associates of the controlling interest in the electric light and power, street railway, and gas properties at Jackson, along with other electric light, power and street railway companies at Vicksburg, Columbus and Greenville. Mr. Couch is a brother of H. C. Couch, president of the Arkansas Light & Power Company and the Pine Bluff Company, at Pine Bluff, Ark.

H. F. Cameron Promoted

H. F. Cameron has succeeded C. P. Couch as manager of the Arkadelphia-Malvern district of the Arkansas Light & Power Company. Mr. Cameron was formerly manager of the Lake Charles Railway, Light & Water Works Company, operating the electric light and power, street railway and water systems in Lake Charles. He resigned this position to become vice-president and general manager of the Texas Gas & Electric Company. He became connected with the Arkansas Light & Power Company several months ago. For about two months he has been located at Malvern in charge of construction work there.

Thomas H. Nicholl Advanced

Thomas H. Nicholl was appointed superintendent of motive power of the Union Traction Company of Indiana, Anderson, on, July 1, 1923. Mr. Nicholl received his early education in the Anderson public schools and his college training at the University of Michigan. After leaving the University he was employed by the Union Traction Company of Indiana, in the electrical, mechanical and maintenance of way departments.

Thomas H. Nicholl

When war broke out he entered the first officers' training camp at Fort Benjamin Harrison and was appointed a second lieutenant in the regular army, after which he was promoted to a captaincy and served two and one-half years as captain of infantry.

After leaving the army he was employed in the engineering departments of the Mid-West Engine Company of Anderson, the Como Chemical Company of Kokomo and the Ball Brothers Glass Company, of Muncie, Ind.

In 1922 he accepted a position with the Union Traction Company of Indiana as assistant to the superintendent of motive power and from this position was promoted to his present position. The company operates one of the largest interurban systems in the country. It comprises more thaen 450 miles of track.

H. M. Blain Directs State Publicity Bureau

H. M. Blain, the director of the newly formed Louisiana-Mississippi Committee on Public Utility Information, mention of which was made in the ELECTRIC RAILWAY JOURNAL, issue of July 14 will bring to this committee valuable experiences gained in his various educational and journalistic endeavors. He made his Ph. D. at the University of Virginia and was elected to Phi Beta Kappa at the Washington & Lee University. From 1907 to 1920 Mr. Blain, as professor in the Louisiana State University, organized and developed the Department of Journalism and originated the combination of theory and practice in classroom and newspaper office for students. He was at one time managing editor of the *State-Times* at Baton Rouge, La. From 1917 to 1920 he was secretary American Association of Teachers of Journalism and from 1920 to 1923 manager of the Associated Rice Millers of America, an organization advertising rice nationally. During that time he edited a monthly magazine to the trade. In 1923 Dr. Blain was elected professor of Journalism at Tulane University. In the summer of 1916 he served as professor of journalism at the New York University.

W. P. Johnston has been appointed assistant general freight and passenger agent of the Spokane & Eastern Railway & Power Company and the Inland Empire Railroad at Spokane.

D. L. Evans, who has been business and commercial superintendent of the Georgia Railway & Power Company at Gainesville, Ga., has been placed in charge of the local railway lines of the company there with the title of superintendent.

C. D. SeCheverell, for the past four years secretary of the Wisconsin Railroad Commission, has resigned to join the Middle West Utilities Company organization. He will be assistant to Martin J. Insull, president of the Central Power Company, and for the present will be located at Grand Island. Neb. Before coming to Madison Mr. SeCheverell was for a number of years an executive of the Superior Water, Light & Power Company, Superior. Wis., from which company he resigned to take up war work.

M. H. Newton was appointed on July 1 advertising manager, Cleveland territory, for the ELECTRIC RAILWAY JOURNAL, succeeding David Cameron. who has been transferred to the New York office as business manager. Mr. Newton has been continuously associated with the transportation business since 1908. He was for a number of years a reporter for the Brooklyn *Eagle*. He comes to the McGraw-Hill Company from the position of advertising manager of the White Company, Cleveland. Mr. Newton is a member of the Cleveland Advertising Club and the Advertising Club of New York.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

British Thomson-Houston Company Prosperous

Addressing the annual meeting of the British Thomson-Houston Company in London recently, H. C. Lewis, the chairman, said that the directors' report would be considered satisfactory in view of trade conditions during the past year. The dividend on the ordinary shares was the same as last year and a somewhat larger amount was carried forward. The volume of orders received during the year was greater than in the preceding twelve months. A comparison between the current liabilities and the liquid assets showed that the company was in a very strong financial position. The liquid assets were about four times the current liabilities. The profit for the year, after deducting all expenses and charges other than interest on debentures and loans, was £494,592. To this there was to be added the amount brought forward from the previous year, £230,704, making the total amount to be dealt with £725,296. From this was deducted £118,614 for interest on debentures and loans; £99,386 for various depreciations; £13,125 had been written off the cost of converting the preference shares, and £50,000 has been set aside for a general reserve. This left to be carried to the balance sheet £444,171. Dividends on the preference shares had been paid up Dec. 15 last, and the directors now recommended that a dividend of 6 per cent, free of income tax, be declared and paid at once on the ordinary shares, which would absorb £120,000, and leave to be carried forward £236,671.

Orders of General Electric Increase

Orders received by the General Electric Company for the three months ended June 30, 1923, were $84,249,710, an increase of 34 per cent over a similar period for last year, according to the quarterly report of stockholders signed by President Gerard Swope.

New Wire Plant in Chicago

Announcement has recently been made of the organization of the Brenner-Moxley-Mervis Company to engage in the production of copper rods and drawn copper wire for electrical and power transmission. At the outset, the company will confine itself to the production of the articles mentioned, but eventually it is planned to manufacture various allied products as well. It is claimed that the location of the new plant, which will be in the southwest side industrial district of Chicago, will relieve Mid-West consumers of heavy freight charges and considerable delays involved in long-haul shipments from the East. The president of the new company is Nathan P. Brenner, who is also the head of the American Insulated Wire & Cable Company. The vice-presidents are William J. and George T. Moxley. N. P. Brenner, Jr., is treasurer and Meyer B. Mervis is secretary. These five men also comprise the directorate of the new company.

Army Surplus Sales

A series of advertisements now being published by the government tells the story of what has been accomplished by the Director of Sales in disposing of the huge surplus stock of army material. The first advertisement of the series appeared on July 21, and each one tells a different story of what has been accomplished. The announcement that the final sales will be conducted by the War Department in September draws attention to the remarkable success that has attended previous sales. More than 2½ billion dollars worth of merchandise has been disposed of in this way. Several years ago, before the commencement of the sales, it was generally predicted that the dumping of such large quantities of goods on the market would have a disastrous reaction, and seriously interfere with normal business. Events have not justified these predictions, however. The sales have been so skillfully conducted that they have passed almost unnoticed, in spite of the vast quantity of material disposed of.

Timber Famine Here

Timber is being destroyed faster than it is being replaced, quality is growing poorer and prices are becoming higher according to Col. William B. Greeley, chief of the United States Bureau of Forestry, who is actively aiding the Federated American Engineering Societies in a nationwide movement for reforestation. He states that originally the United States contained five trillion board feet of stumpage; now only 1,600 billion feet of virgin timber and 600 billion feet of culled and second growth remain. Soft wood is being cut eight times as fast as it is being replaced, and hard wood three times as fast. Of all timber 75 per cent being cut is not being replaced.

The average price of retail lumber advanced from 1840 to 1921 three and one-half times as rapidly as the index price of all commodities. In 1870 the per capita consumption was 345 board feet; in 1906 it was 516 board feet; in 1920 it had dropped to 315 board feet. Timber famine, as to the eastern and central United States, is not hypothetical or distant; it is here.

Colonel Greeley describes the manifest requirements of the situation as: First, make the timber we have go as far as it will through reducing waste and improving the efficiency of its use. Second, make progress as rapidly as possible toward a permanent and sustaining supply of timber by increasing the growth in woodlands and by putting idle acres to work growing trees.

ELECTRIC RAILWAY MATERIAL PRICES—JULY 31, 1923

Metals—New York

Copper, electrolytic, cents per lb.	14.50
Lead, cents per lb.	6.55
Nickel, cents per lb.	29.50
Zinc, cents per lb.	6.65
Tin Straits, cents per lb.	37.75
Aluminum, 98 to 99 per cent, cents per lb.	25.50
Babbitt metal, warehouse, cents per lb.:	
Fair grade	52.00
Commercial	25.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads	$5.475
Somerset mine run, Boston	2.625
Pittsburgh mine run, Pittsburgh	1.95
Franklin, Ill., screenings, Chicago	1.675
Central, Ill., screenings, Chicago	1.375
Kansas screenings, Kansas City	2.625

Track Materials—Pittsburgh

Standard Bessemer steel rails, gross ton	$43.00
Standard open hearth rails, gross ton	43.00
Railroad spikes, drive, Pittsburgh base, cents per lb.	3.15
Tie plates (flat type), cents per lb.	2.575
Angle bars, cents per lb.	2.75
Rail bolts and nuts, Pittsburgh base, cents, lb.	4.125
Steel bars, cents per lb.	2.40
Ties, white oak, Chicago, 6 in.x8 in.x8½ ft.	$1.50

Hardware—Pittsburgh

Wire nails, base per keg	3.00
Sheet iron (28 gage), cents per lb.	3.85
Sheet iron, galvanized (28 gage), cents per lb.	5.00
Galvanized barbed wire, cents per lb.	3.80
Galvanized wire, ordinary, cents per lb.	3.35

Waste—New York

Waste, wool, cents per lb.	12–16
Waste, cotton (100 lb. bale), cents per lb.:	
White	11–13.50
Colored	8–13

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), per gal.	$1.02
White lead (100 lb. keg), cents per lb.	11.85
Turpentine (bbl. lots), per gal.	$0.95
Car window glass, (single strength), first three brackets, A quality, discount*	84.0%
Car window glass, (single strength), first three brackets, B quality, discount*	86.0%
Car window glass, (double strength) all sizes, A quality, discount*	85.0%
Putty, 100 lb. tins, cents per lb.	4.75

*These prices are f.o.b. works, boxing charges extra.

Wire—New York

Copper wire base, cents per lb.	17.50
Rubber-covered wire, No. 14, per 1,000 ft.	$7.00
Weatherproof wire base, cents per lb.	18.75

Paving Materials

Paving stone, granite, 4x8x4, f.o.b.	
Chicago, dressed, per sq.yd.	$3.50
Common, per sq.yd.	3.10
Wood block paving 3½, 16 treatment, N. Y., per sq.yd.	2.79
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots	54.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd.	1.75
Cement, Chicago consumers net prices, without bags	2.20
Gravel, ¾-in., cu.yd., f. o. b. N. Y.	1.75
Sand, cu.yd., N. Y.	1.25

Old Metals—New York

Heavy copper, cents per lb.	11.50
Light copper, cents per lb.	10.00
Heavy brass, cents per lb.	6.00
Zinc, old scrap, cents per lb.	4.00
Yellow brass, cents per lb. (heavy)	6.00
Lead, heavy, cents per lb.	5.25
Steel car axles, Chicago, net ton	$17.75
Old car wheels, Chicago, gross ton	20.25
Rails (short), Chicago, gross ton	19.50
Rails, (relaying), Chicago, gross ton	33.50
Machine turnings, Chicago, net ton	8.75

Rolling Stock

Savannah Electric & Power Company, Savannah, Ga., is reported to have ordered eight new one-man safety cars.

Department of Street Railways, Detroit, Mich., is considering the purchase of from fifty to one hundred new cars of the Peter Witt type. Although the details as to how the purchase will be financed have not been decided the object in placing the orders in the near future is to have the cars on hand for next spring. Proposals are being asked by the city Department of Purchases and Supplies for the sale of twenty-five of the city's double end one-man safety cars which the department proposes to dispose of.

Track and Line

Eastern Wisconsin Electric Company, Sheboygan, Wis., plans to replace the old tracks on Ninth Street, Oshkosh with a modern type of equipment including the latest style of steel rails, steel ties and bonding.

Jackson Railway & Light Company, Jackson, Tenn., is making track improvements which will cost about $35,000. The East Jackson line from Main to Royal is being modernized. A foundation of white limestone rock is being placed under the tracks.

Springfield Street Railway, Springfield, Mass., is relocating its tracks over Pecousic Hill on the Hartford East Side line, near the Springfield-Longmeadow boundary, preparatory to the widening, straightening and regrading of Pecousic Avenue by the city of Springfield.

Los Angeles Railway has started extension of the Brooklyn Avenue line. The new track will extend from the present terminal at Wabash and Indiana Streets to connect with the old and unused part of the Gage Street line. In addition to the new work the old track will be reconstructed.

Nashville Railway & Light Company, Nashville, Tenn., has been granted permission to change the alignment and grades on its Belle Meade line out of Nashville to conform to the new Federal aid highway being built beside this line. The change is about 2½ miles in length and tracks will be moved to the center of road. A double boulevard will be eventually built.

Bamberger Electric Railroad, Salt Lake City, Utah, is constructing spur tracks at Farmington and Kaysville, Utah, which will more adequately serve the shipping interests of Davis County and act as a stimulus toward the introduction of new industries. The Farmington spur will serve the Continental Oil Company, which has purchased property for the erection of oil tanks and warehouses at that location. The Kaysville spur will serve several important industries at that point.

Pacific Electric Railway, Los Angeles, announces that work will commence immediately upon the construction of a 2-mile extension of its Alhambra-San Gabriel line from the present San Gabriel terminus. The proposed line extension is to serve newly developed territory that has been extensively settled during the rapid growth of southern California. Present plans call for the completion of the project by Nov. 1 at a total cost of $250,000. At an estimated cost of $742,000, the company has the following reconstruction program now under way on its lines in southern California:

Long Beach, Pine Avenue, reconstruct and repave 3,920 lin.ft. of double track, using 7-in., 128-lb. grooved girder rail, rock ballast, mechanically tamped, and repaving with asphalt concrete pavement; continuous joints and double-concealed bonds.

Pasadena, South Lake Avenue, reconstruct and repave 3,600 lin.ft. of double track, replacing 6-in., 72-lb. T rail with 7-in., 128-lb. grooved girder rail; rock ballast, mechanically tamped; continuous joints and double-concealed bonds; repaving with asphalt concrete pavement.

Pasadena, East Colorado Street, reconstruct and repave 8,700 lin.ft. of double track, replacing 4¼-in., 60-lb. A. S. C. E. rail with 7-in., 128-lb. grooved girder rail; continuous joints and double-concealed bonds; rock ballast, mechanically tamped; replace oil macadam pavement with asphalt concrete pavement.

Los Angeles, South Hill Street, West 16th Street line, also same line of West 16th Street, from Hill Street to Flower Street reconstruct and repave 4,580 lin.ft. double track-combination-gage track, replacing 61in., 72-lb. T rail with 7-in., 128-lb. grooved girder rail; rock ballast, mechanically tamped; continuous joints and double-concealed bonds; asphalt concrete pavement.

Power Houses, Shops and Buildings

Denver & Interurban Railroad, Denver, Col., has completed the construction of a new carhouse.

Western Ohio Railway, Lima, Ohio, is installing a turbine of 2,500 kw. capacity to produce 60-cycle current at the St. Marys power house, in place of a 1,100 kw. unit operating at 25 cycles.

Twin State Gas & Electric Company, Brattleboro, Vt., is going forward with the construction of the new addition to the power house at Gorham, N. H. The work is being done by the Sanders Engineering Company of Portland, Me. It is expected that the job will be completed about Jan. 1, 1924.

Bangor, Me.—Plans are being formulated which will link up all the power systems of Maine from Bangor to the New Hampshire line. It will mean an interconnection of the lines of the Central Maine Power Company, the Cumberland County Power & Light Company and the Bangor Railway & Light Company. Heretofore, these companies in emergencies have been entirely dependent upon their own resources. The Cumberland County Power & Light Company formerly served the western section of the state, the Central Maine Power Company is serving the central part of the state and the Bangor Railway & Light Company the eastern section. Complete details of the new construction have not yet been determined.

Trade Notes

H. L. Erlicher, formerly assistant to the general purchasing agent of the General Electric Company, has been named assistant general purchasing agent, effective Aug. 1, 1923.

Burford, Hall & Smith, American Trust & Savings Bank Building, Birmingham, have been appointed district representatives for the sale of diamond soot blowers by the Diamond Power Specialty Corporation of Detroit.

Root Spring Scraper Company, Kalamazoo, Mich., announces that Ross F. Hays, 2 Rector Street, New York City, is its representative east of Buffalo, with the exception of the New England States, where the Charles N. Wood Company, 948 Old South Building, Boston, are the representatives.

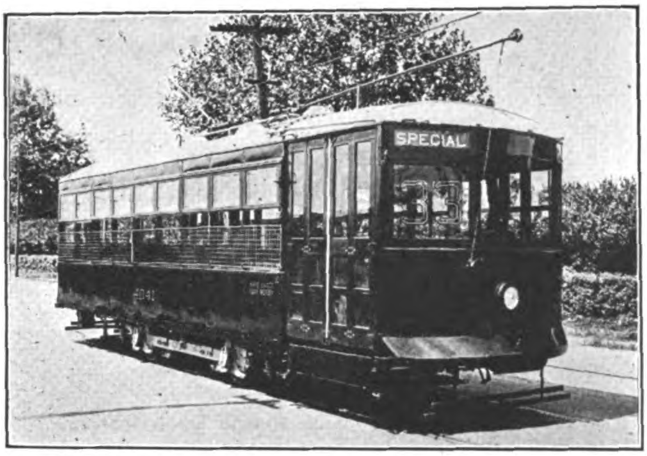
Portland Cement Association, Chicago, Ill., announces the appointment of James A. Hudson as district engineer in charge of a new association office just opened in Memphis in the Exchange Building. J. R. Fairman has been appointed district engineer in charge of a new office in Birmingham in the Jefferson County Bank Building and P. H. Johnston has been appointed district engineer in charge of a new office in Jacksonville in the Graham Building.

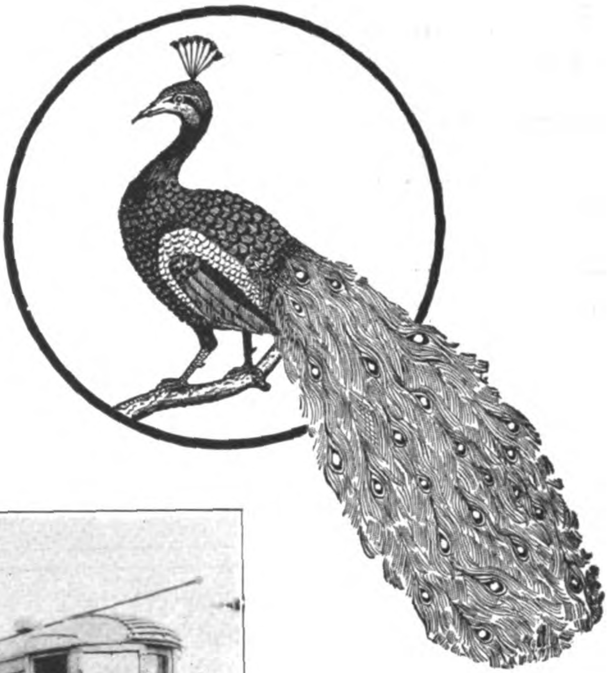
Surplus Steel Exchange, Inc., New York, N. Y., which was recently organized, announces the opening of an office in Chicago, in order to handle the listings and inquiries from that district which have hitherto been dealt with from New York. The Chicago office will be at 2257 Oakdale Avenue, in charge of A. E. Thiffault and Raymond I. Caspers both of whom have long been affiliated with the steel trade.

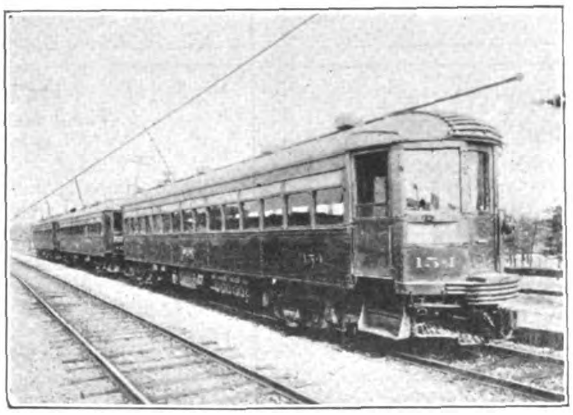
Robert E. Fritsch, 6601 Limekiln Pike, Philadelphia, announces that he has now entered the field of engineering, specializing on the study of electrolysis, and is ready to serve his past friends as well as future clients. He has severed his connection of more than eleven years with the E. E. Brownell Engineering Company. During this time he made a special study of electrolysis and devoted much time to its effect and its cure in connection with gas, water and lead sheath underground cable.

New Advertising Literature

Ohmer Fare Register Company, Dayton, has just published an interesting and attractively bound 51-page booklet entitled "Evidence — Expert Testimony Of Those Best Qualified by Ability and Experience To Make Decisions." The booklet is principally a reproduced collection of letters which the company has received endorsing the value of Ohmer Fare Registers by the most able electric railway operators in this country and Canada. Some extracts giving opinions on the Ohmer system of fare accounting are included.







Overloaded "Safety" or Heavy Interurban

No matter what type of car you operate, your needs for efficient, adequate and above all, *reliable* emergency braking equipment can best be met by one of the various types of—

PEACOCK BRAKES

Peacock Brakes have been designed with a practical knowledge of braking forces necessary to hold heavily overloaded passenger cars on the stiffest gradient.

For safety cars—the Peacock Staffless Brake has become a widely recognized standard of equipment in connection with the design of these little cars. Its light weight, small space requirements, and its powerful braking ability render it almost invaluable.

For heavy cars—a wide variety of sizes and types of Peacock Improved Brakes to meet requirements of the particular weight of car and class of service involved. Peacock Improved Brakes all have the unique eccentric chain-winding drum and automatic stop features.

For all your cars—specify Peacock Brakes.

National Brake Company, 890 Ellicott Square, Buffalo, N. Y.

Canadian Representative
Lyman Tube & Supply Co., Ltd., Montreal, Can.

Bankers and Engineers

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Incorporated
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Incorporated
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THE ARNOLD COMPANY
ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL
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ELECTRIC RAILWAY ENGINEER
WORCESTER, MASSACHUSETTS
REPORTS—APPRAISALS—RATES—OPERATION—SERVICE

JAMES E. ALLISON & CO.
Consulting Engineers
Specializing in Utility Rate Cases and Reports to Bankers and Investors
1017 Olive St., St. Louis, Mo.

STEVENS & WOOD, INC.
Design and Construction of Power Stations
Railroad Electrification, Industrial Plants
REPORTS AND APPRAISALS
Management and Financing of Utilities and Industrials
Youngstown New York

HEMPHILL & WELLS
CONSULTING ENGINEERS
Gardner F. Wells John F. Layng Albert W. Hemphill
APPRAISALS
INVESTIGATIONS COVERING
Reorganization Management Operation Construction
43 Cedar Street, New York City

THE J. G. WHITE ENGINEERING CORPORATION
Engineers—Constructors
Industrial Plants, Buildings, Steam Power Plants, Water Powers, Gas Plants, Steam and Electric Railroads, Transmission Systems
43 Exchange Place, New York

JOHN A. BEELER
Operating, Traction and Traffic Investigations
Routing Surveys—Valuations—Operation Management
52 Vanderbilt Ave., NEW YORK

A. L. DRUM & COMPANY
Consulting and Constructing Engineers
VALUATION AND FINANCIAL REPORTS
RATE STUDIES FOR PRESENTATION TO PUBLIC SERVICE COMMISSIONS
CONSTRUCTION AND MANAGEMENT OF ELECTRIC RAILWAYS
76 West Monroe Street, Chicago, Ill.
215 South Broad Street Philadelphia, Pa.

ENGELHARDT W. HOLST
Consulting Engineer
Appraisals, Reports, Rates, Service Investigation, Studies on Financial and Physical Rehabilitation
Reorganization, Operation, Management
683 Atlantic Ave., Boston, Mass.

JOE R. ONG
Consulting Transportation Engineer
Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation
PIQUA, OHIO

EDWIN WORTHAM, E.E.
Consulting Engineer
Valuations of Electric Railways and Utilities of All Kinds
Traffic and Operating Studies
Allison Bldg. Richmond, Va.
Established Feb. 1913.

WALTER JACKSON
Consultant on Fares, Buses, Motor Trucks
Originator of unlimited ride, transferable weekly pass. Campaigns handled to make it a success.
143 Crary Ave., Mt. Vernon, N. Y.

The Most Successful Men in the Electric Railway Industry read the
ELECTRIC RAILWAY JOURNAL
Every Week

Dwight P. Robinson & Company
Incorporated
Design and Construction of
Electric Railways, Shops, Power Stations
125 East 46th Street, New York
Chicago Youngstown Montreal
Philadelphia Los Angeles Rio de Janeiro

J. ROWLAND BIBBINS
Engineer—921 Fifteenth St., WASHINGTON, D. C.
TRANSPORTATION
Complete Transit Surveys and Development Programs, adapting Motor-Transport, R.R. Terminal and City Plans. Traffic, Service, Routing, Operation and Valuation. EXPERIENCE IN 20 CITIES

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Transmission Line and Special Crossing Structures, Catenary Bridges
WRITE FOR OUR NEW DESCRIPTIVE CATALOG
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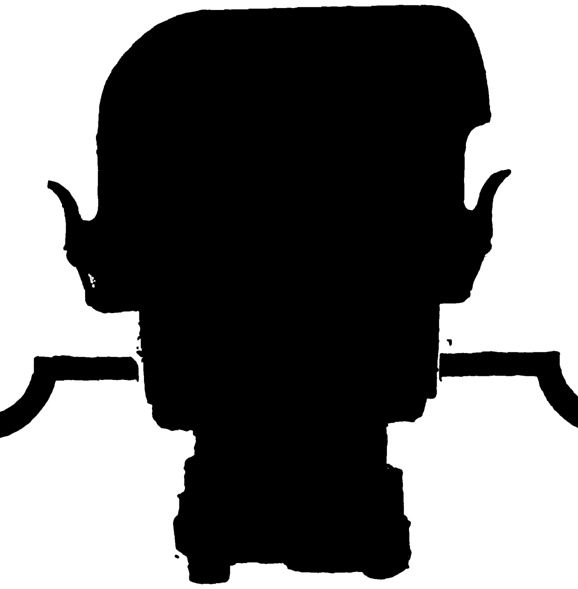
DAY & ZIMMERMANN, INC.
ENGINEERS
Design, Construction
Reports, Valuations, Management
NEW YORK PHILADELPHIA CHICAGO

Advertisements for the
Searchlight Section

Can be received at the New York Office of Electric Railway Journal until 10 a. m.
Wednesday
For issue out Saturday
0220

THE P. EDWARD WISH SERVICE
50 Church St. *Street Railway Inspection* 131 State St.
NEW YORK DETECTIVES BOSTON

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.



ALLIS-CHALMERS

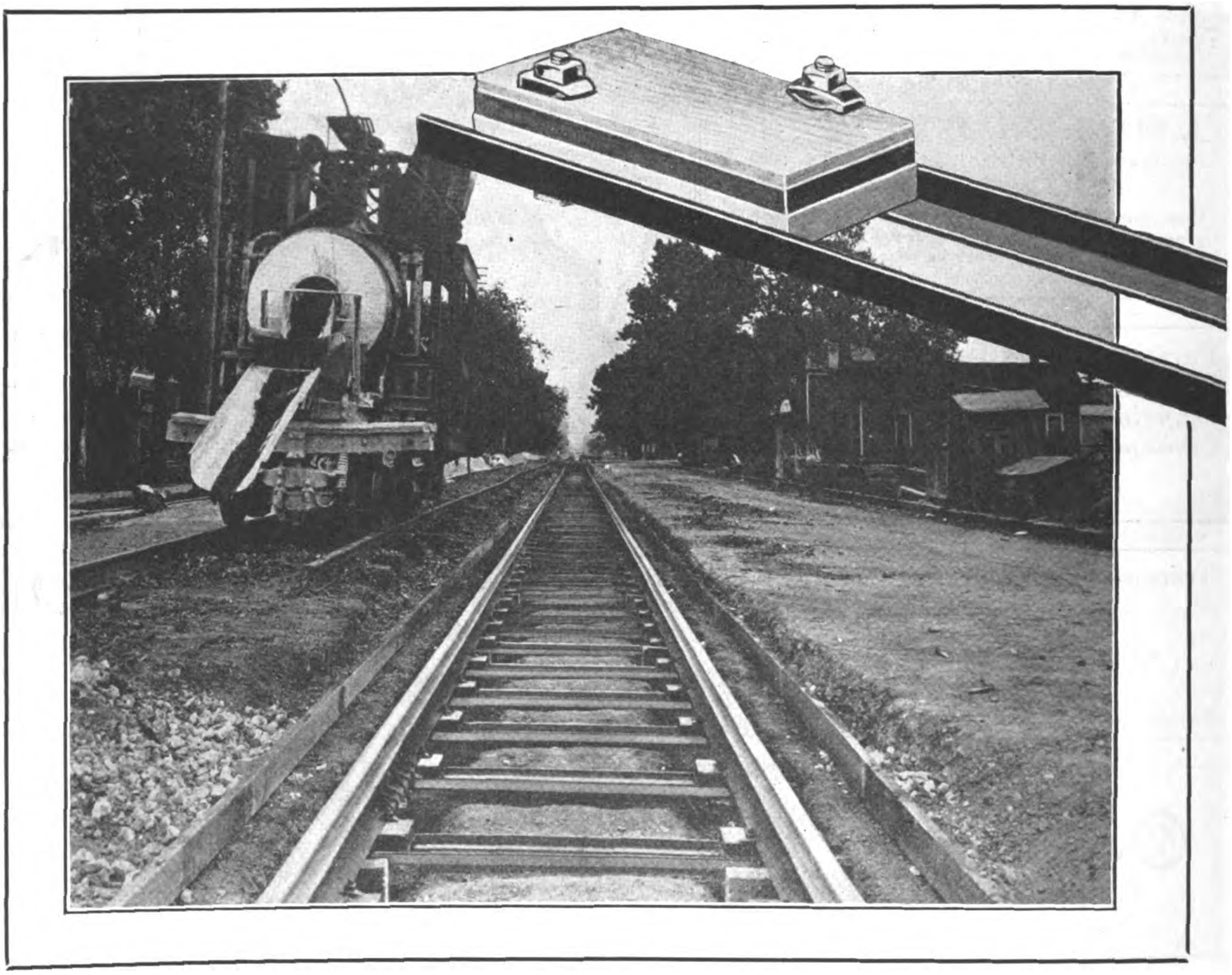
Type OB Governor for Air Brake Equipment

The dependability of this governor has led to its adoption by railways and other users of air compressors.

Send for Bulletin 1091

ALLIS-CHALMERS
MANUFACTURING COMPANY
MILWAUKEE, WISCONSIN. U.S.A.

The Answer to 6 Searching



The Long View

The long view—what is it? Permanent, low cost track construction to begin with.

Nurturing public good will by means of, as nearly as possible, shockless and noiseless operation, in the second place.

And, finally, increased profits for street railway companies.

How? The DAYTON Resilient Tie.

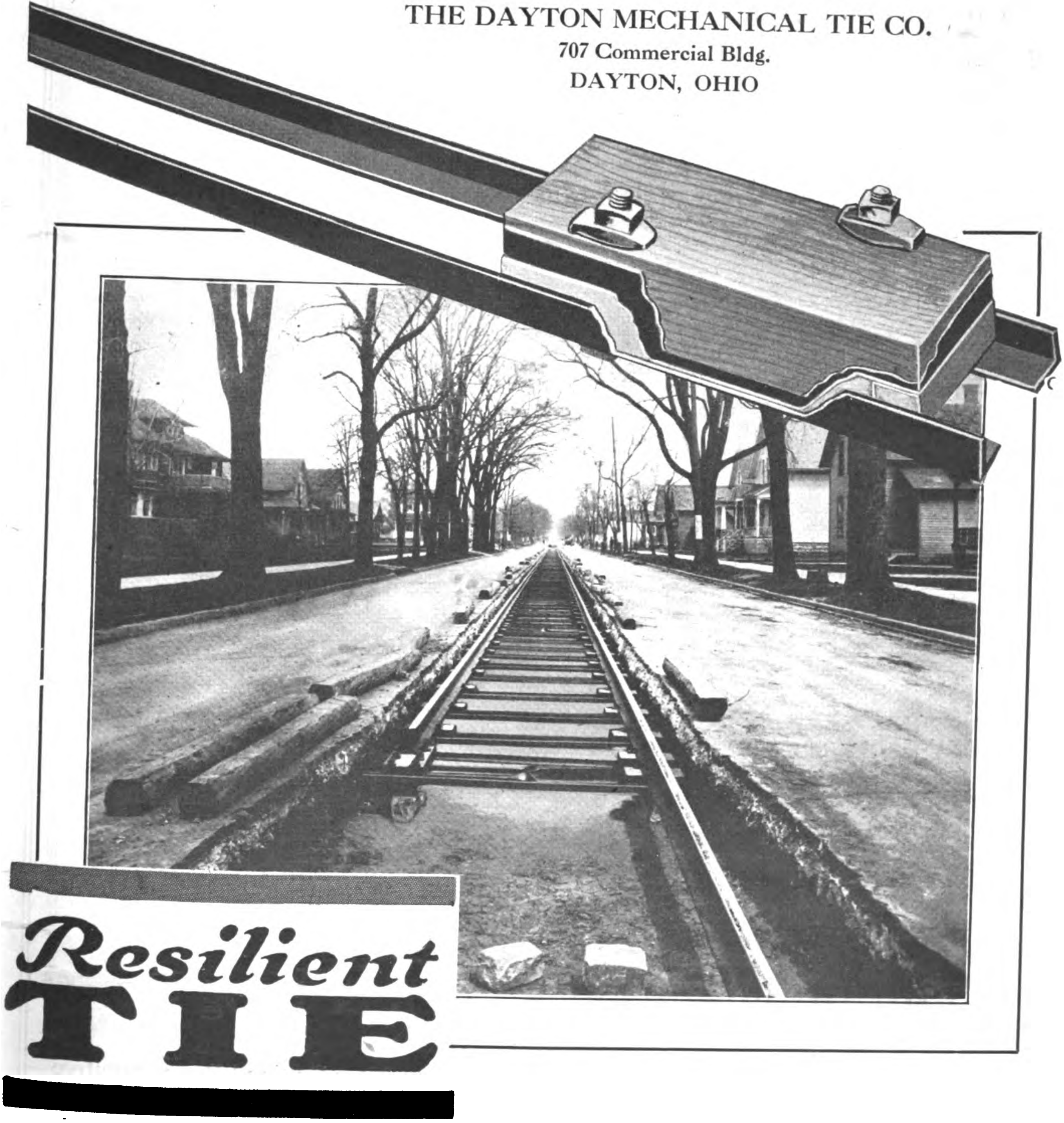
DAYTON

Street Railway Questions

1. How can the cost of new track be reduced?
2. How can the life of track be increased?
3. How can track and paving repairs be reduced?
4. How can the upkeep for rolling stock be reduced?
5. How can power be saved?
6. What can be done to lessen traffic noise?

The answer: through the use of DAYTON Resilient Ties. Figures *prove* that their use results in a substantial saving over wood ties in gravel ballast, and a much bigger saving over wood ties in concrete foundation. Ask for the PROOF that the DAYTON Resilient Tie is the answer to the other five questions as well.

THE DAYTON MECHANICAL TIE CO.
707 Commercial Bldg.
DAYTON, OHIO



Resilient
TIE

Report of Investigation of

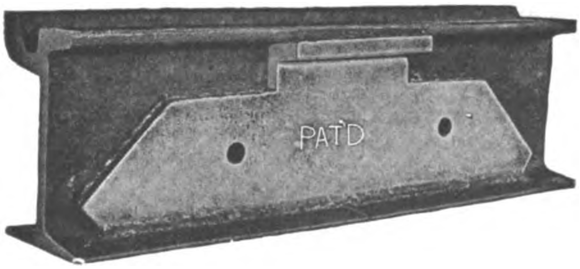
"INDIANAPOLIS"

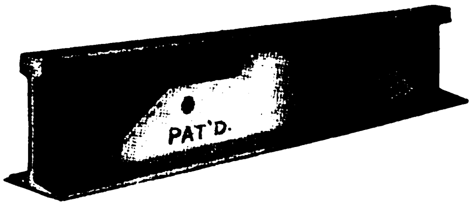
Type of Welded Rail Joints

They Meet All Requirements

To Wit as Follows:

1. **Conductivity**—138%—United States Bureau of Standard Test.
2. **Strength**—Over 100% — Robert W. Hunt & Co., Testing Laboratories.
3. **Endurance**—11 years in Service—Still Intact.
4. **Dependable**—Less than 1% Failure. When installed as directed by manufacturer.
5. **Economical**—Cost Less Than Bolted and Bonded Joints.
6. **Available**—Any road. Any quantity — from One (1) to Ten Thousand (10,000).
7. **Universal**—In use on **over** 125 Different Rail Sections.
8. **Endorsed**—In use on over 200 properties.





WHY?

Because —

They are Scientifically Designed
A Special Product for a
Specific Purpose

Completely and Perfectly Effecting the
"CONTINUOUS RAIL"

"Perfection in Principle Proven in Performance"

The Indianapolis Switch & Frog Co.

SPRINGFIELD, OHIO

J. J. Costello Boston, Mass. New England Representative

See This Useful Series For 10 Days—FREE

You are reading this advertisement because you can use up-to-date electric railway data. We do not know if you are concerned with construction, operation or maintenance problems. We do know that the Electric Railway Library is unrivalled as a source of clear-cut facts on the subject. To convince you of the usefulness of this set of books we will send them for 10 days' FREE examination. If you decide to keep them, payment may be made on liberal subscription terms.

ELECTRIC RAILWAY LIBRARY

4 volumes, over 2,000 pages, fully illustrated
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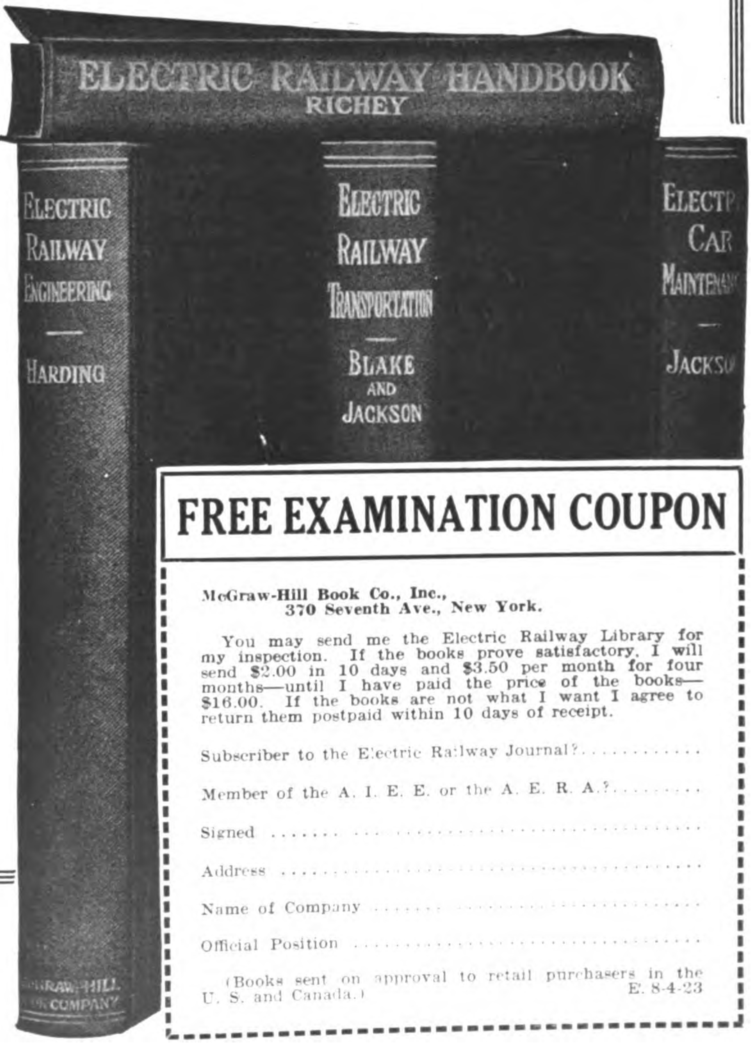

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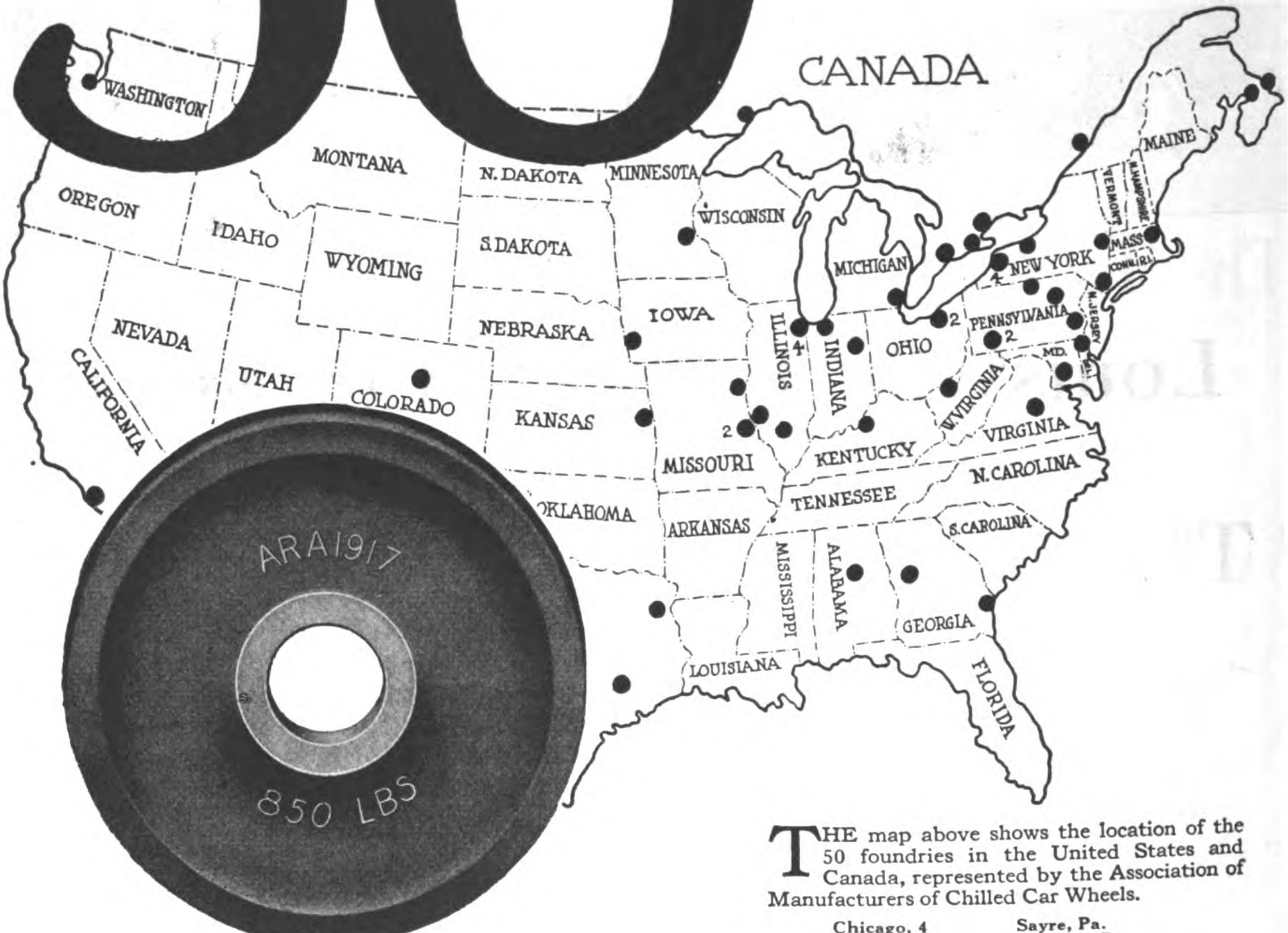
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Buffalo, 4
Pittsburgh, 2
Cleveland, 2
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Montreal
Mich. City, Ind.
Louisville
Mt. Vernon, Ill.
Ft. Wayne, Ind.
Birmingham
Atlanta
Savannah
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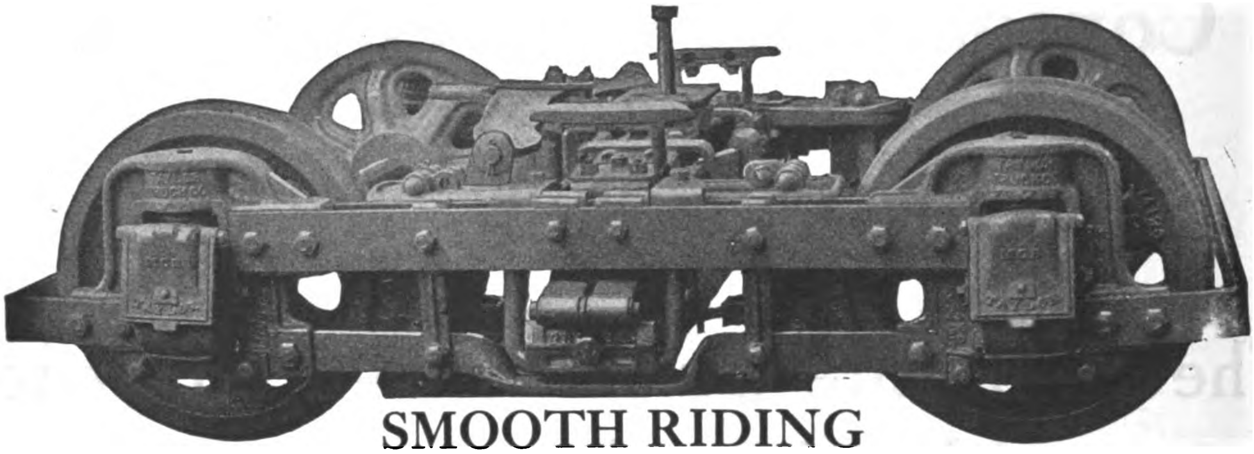

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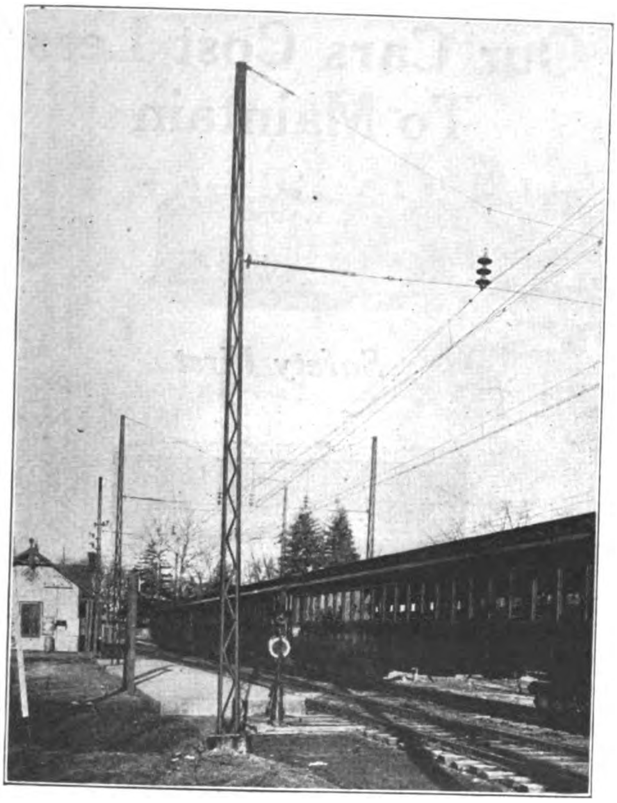

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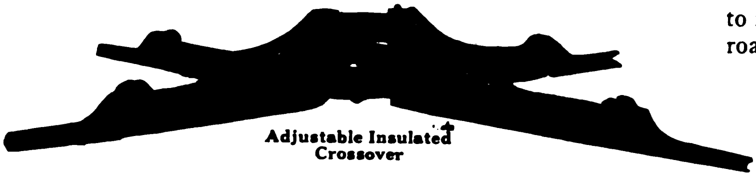

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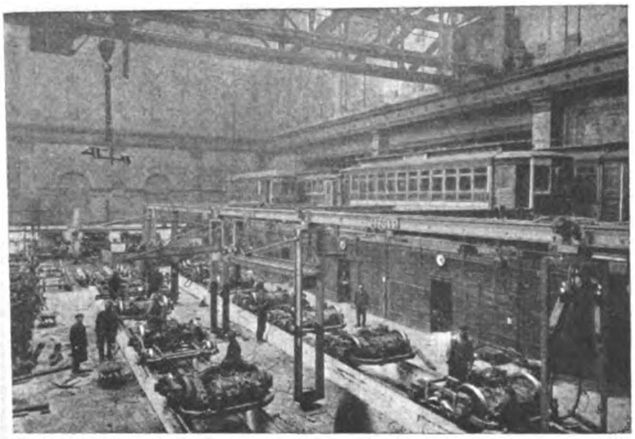

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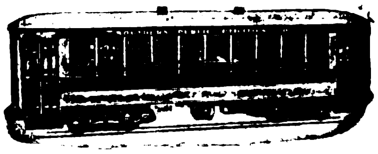

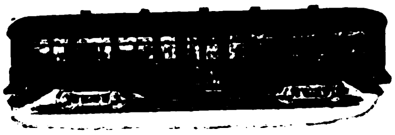

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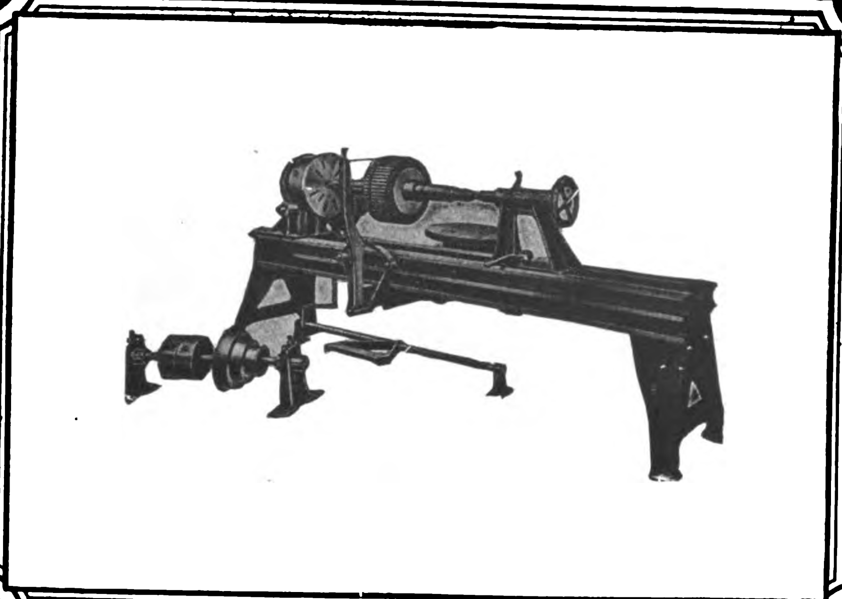

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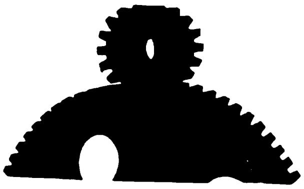
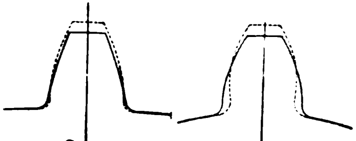


Helical Gearing



Dotted line shows tooth-form 4½° involute. Solid line shows tooth-form of Nuttall Helicals.

Rounded Teeth

Nuttall Helical Gears and Pinions mesh much like a big nut engages the threads of a screw. There is *no* shock, no vibration, and almost no wear. This lengthens equipment life.

The tooth form of Nuttall Helical Gears is scientifically correct. There is no undercut at the tooth root where the greatest strength is required. This is another item materially increasing the life of equipment.

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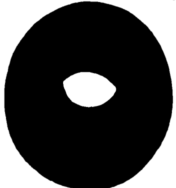
We mention a few seemingly minor features to show you how deeply and thoroughly we go into every detail which will make gears and pinions better.



Special Drop Forged Pinion Blank

Nuttall Pinion Blanks are specially drop forged by a process which practically equalizes the longitudinal and transverse ductility. Ordinary forged pinions are out of proportion in these characteristics in ratios as great as 2 to 1.

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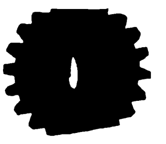
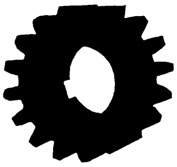
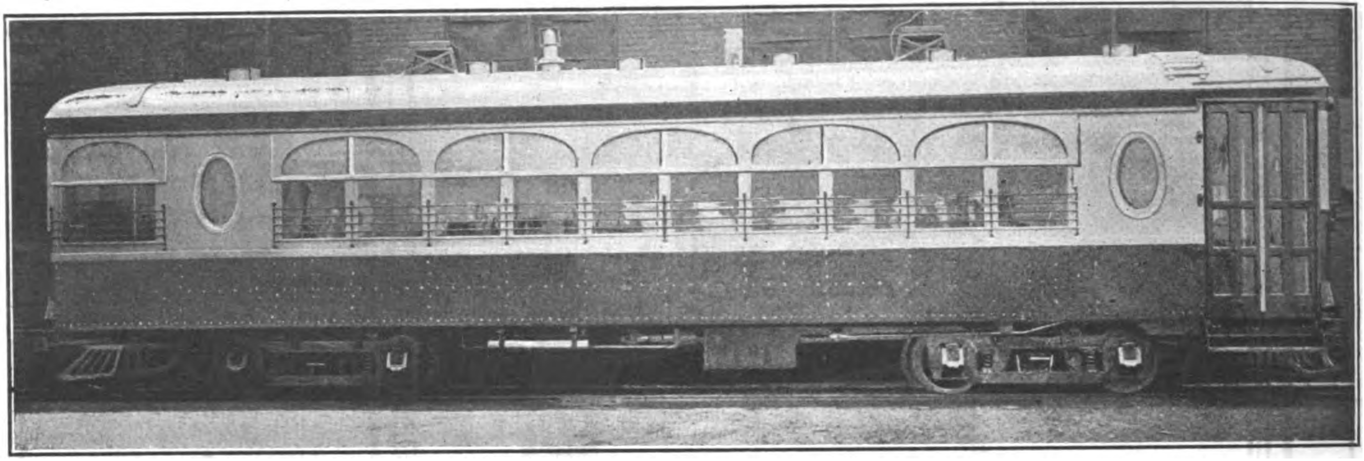


Pinion with Ground Bore



Pinion without Ground Bore.



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Your good judgment will be supported by that of the largest operators in all parts of the World.

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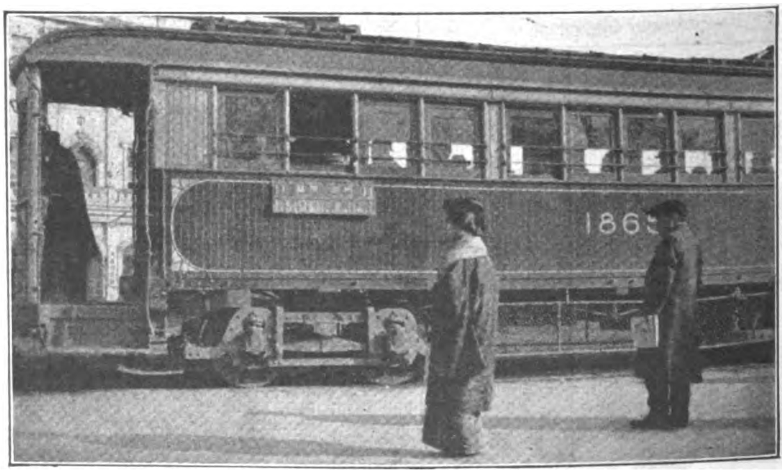

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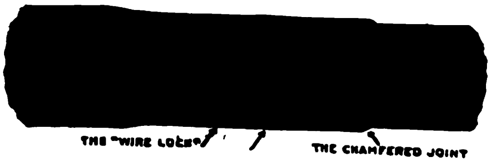

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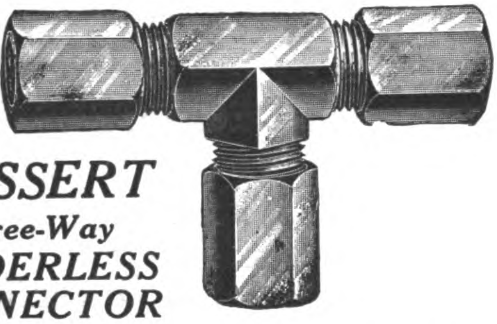

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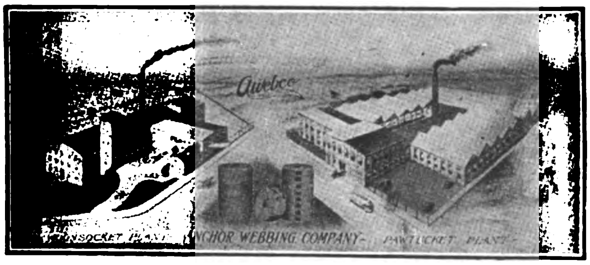
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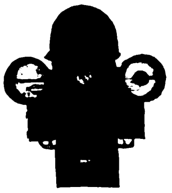

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85 LIBERTY STREET, NEW YORK

Builders since 1868 of Water Tube Boilers of continuing reliability

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Bayonne, N. J.
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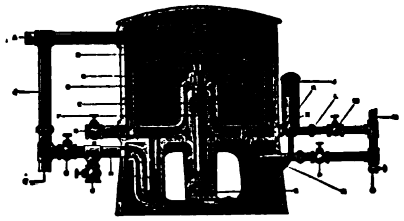
Don't throw the oily waste away!



Save Money By Reclaiming It!

This oil extracting machine is reclaiming hundreds of gallons of perfectly good lubricating oil and many pounds of waste for the Milwaukee Electric Railway & Light Co. as well as many other companies. It will do the same for you. It is widely used as a real economy producing equipment.

Write for full details

OIL & WASTE SAVING MACHINE CO.
Philadelphia, Pa.

BUDA
ESTABLISHED
1881

Special Track Equipment and Layouts of all kinds

THE BUDA COMPANY
Harvey (Suburb Chicago) Illinois

FOSTER SUPERHEATERS

A necessity for turbine protection, engine cylinder economy and utilization of superheat for all its benefits

POWER SPECIALTY COMPANY, 111 BROADWAY, NEW YORK
Boston Philadelphia Pittsburgh Kansas City Dallas Chicago San Francisco London, Eng.

RAMAPO AJAX CORPORATION

Ramapo Automatic Return Switch Stands for Passing Sidings

RACOR
TRADE MARK

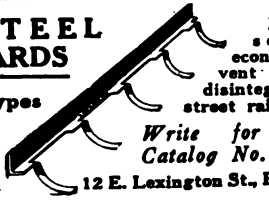
RACOR Tee Rail Special Work.

Manganese Construction

GENERAL OFFICES: HILLBURN, NEW YORK
Chicago. New York Superior, Wis. Niagara Falls, N. Y.
Canadian Ramapo Iron Works, Ltd., Niagara Falls, Ont.

GODWIN STEEL PAVING GUARDS

Adapted to all types of rails and paving.



Proven by service to economically prevent seepage and disintegration of street railway paving.

Write for Illustrated Catalog No. 20.

W. S. GODWIN CO., Inc. 12 E. Lexington St., Baltimore, Md.

BUCKEYE JACKS

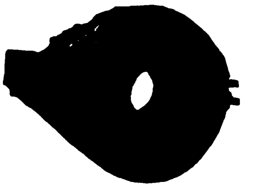
high-grade R. R. Track and Car Jacks

The Buckeye Jack Mfg. Co.
Alliance, Ohio

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut



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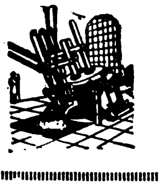
One-Piece Gear Cases
Seamless—Rivetless—Light Weight
Best for Service—Durability and Economy. *Write Us.*

Chillingworth Mfg. Co.
Jersey City, N. J.

MOORE RAPID **'LECTROMELT** FURNACES



MAKE YOUR OWN STEEL AND IRON CASTINGS WHEN AND AS YOU NEED THEM

PITTSBURGH ELECTRIC FURNACE CORPORATION
Largest Maker of Arc Furnaces in the World
PITTSBURGH, PA.

T. S. Q.

Says

"They don't shop and overhaul the cars as often since I've been on the job"

Tool Steel Quality

Heywood-Wakefield
REG. U.S. PAT. OFF

RATTAN

For Car Seats or Snow Sweepers

CLOSELY woven Rattan Car Seat Webbing furnished canvas lined or unlined in widths from 12 to 48 inches. Write for prices and samples.

Snow Sweeper Rattan is carefully selected for its toughness. It is furnished in natural or cut lengths and will produce snow sweeping brooms of the most serviceable nature.

Car Seats, cross or longitudinal, covered with Rattan, Plush or Leather.

HEYWOOD-WAKEFIELD CO.
Factory: **WAKEFIELD, MASS.**

Sales Offices:
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E. F. Boyle, Monadnock Bldg., San Francisco, Cal.
F. N. Grigg, 630 Louisiana Ave., Washington, D. C.
Railway & Power Eng'g Corp., Toronto and Montreal
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TRADE
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MADE IN U.S.A.

The

Standard of Quality

The precise and delicate requirements of manufacturers of dynamos, magnetos and other electrical apparatus prescribe the use of electric tape that is known to be of constant high quality.

Quality is the sum total of good basic materials and careful manufacture—the best grades of yarn plus painstaking, skilled workmanship.

That is why thickness, width, weave, finish and absorption are uniformly correct in HOPE tapes. That is why, for 40 years, manufacturers of electrical apparatus have found HOPE products to be the Standard of Quality.

Let us send you the HOPE Sample Booklet of electric tape, so that you can pick out a tape to meet your own special requirements.

HOPE Electric Tape

HOPE WEBBING COMPANY, INC.
PROVIDENCE - RHODE ISLAND
New York Troy Chicago

You're having brush trouble

CORRECT IT
USE LE CARBONE CARBON BRUSHES

They talk for themselves

COST MORE PER BRUSH
COST LESS PER CAR MILE

W. J. Jeandron
345 Madison Avenue, New York
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Chicago Office: 1657 Monadnock Block
San Francisco Office: 525 Market Street
Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal and Toronto

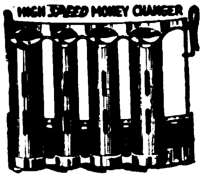
Type R-10
Single Register

Type R-10 International Single Register, here shown, is arranged for hand or foot operation, and also for electric operation. The R-11, Double Register, is arranged for hand operation and for electric operation.

Meets all Requirements

The quarter century and more that we have given to the study of fare collection problems and designing proper mechanical means for registration has given this Company the broad knowledge and manufacturing experience which are necessary to meet the varied requirements of the many types of transportation systems of this time.

The International Register Co.
13 South Throop St., Chicago
Exclusive Selling Agents for HEEREN Enamel Badges.



HIGH SPEED MONEY CHANGERS

1923 model —without rivets— ready for delivery

Supplied in one or four tube Combinations

Essential wherever the rapid and accurate handling of change is required. Now included in the standard equipment of largest Traction Companies because conductors demand them.

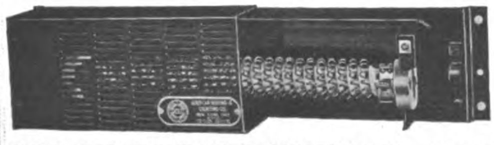
Prices and Literature sent on request

J. L. GALEF, 75 Chambers St., N. Y. C.
Exclusive Manufacturer's Selling Agent

PS HEATERS

Car Heating and Ventilation
are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company
1725 Mt. Elliott Ave., Detroit, Mich.



THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED

No. 478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

BECAUSE of its better protective qualities, Dixon's Silica-Graphite Paint makes frequent repainting unnecessary and so gives better protection at lower cost. It is a natural combination of flake silica-graphite. The vehicle is best boiled linseed oil. It will not peel, crack or flake off because of the natural elasticity of flake graphite, while the silica is an anchor that withstands wear.

Write for Booklet No. 180-B

Joseph Dixon Crucible Co.
Jersey City, N. J.
Established 1827

TRADE D X N MARK

DIXON'S Silica-Graphite PAINT

SILVER LAKE A

Waterproofed Trolley Cord

Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

FOR POSITIVE SATISFACTION ORDER SILVER LAKE

If you are not familiar with the quality you will be surprised at its ENDURANCE and ECONOMY.

Sold by Net Weights and Full Lengths

SILVER LAKE COMPANY
Manufacturers of bell, signal and other cords.
Newtonville, Massachusetts

Fare Boxes *Change Carriers*

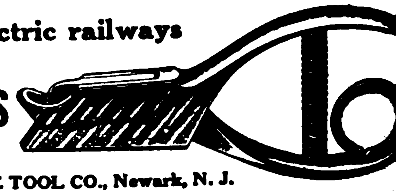
COIN
COUNTERS SORTERS WRAPPERS

THE CLEVELAND FARE BOX CO.
CLEVELAND, OHIO
Canadian Branch, Preston, Ontario

HALE & KILBURN
CAR SEATS

For Every Class of Service

General Offices and Works: Philadelphia
Offices: New York, Chicago, St. Louis, Washington, San Francisco

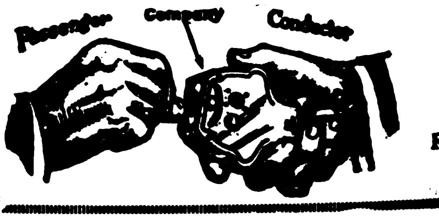


75% of the electric railways use

B-V Punches

Send for Catalog

BONNEY-VEHSLAGE TOOL CO., Newark, N. J.



Direct
Automatic
Registration
By the
Passenger
Rooke [illegible]
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FORD TRIBLOC

FORD

TRIBLOC

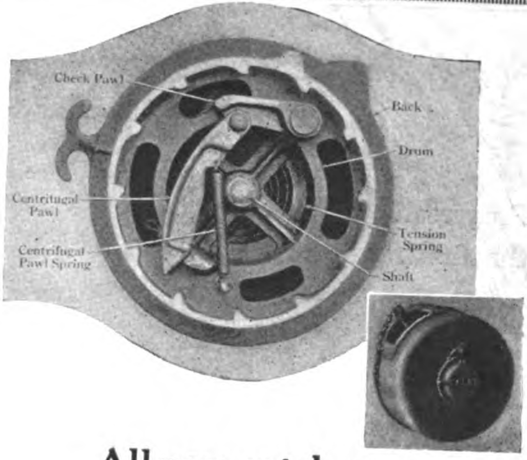
Look for the Green Loop Guide

A speedy and highly efficient chain hoist. Built in capacities from ¼ to 20 tons. Write for Catalog 5-B containing complete information.

FORD CHAIN BLOCK CO.
2nd and Diamond Sts., Philadelphia, Pa.
Over eas Representative: Allied Machinery Company of America, 51 Chambers Street, New York, N. Y.

2231-

CHAIN HOISTS



All new catchers are good—

But when they wear so that the pole is checked too late., they're junk. The short fat check pawl of

Earll Catchers and Retrievers

engages full face-on. No points or edges to wear or batter. Even aged Earlls check the pole as promptly as when new. Throughout an almost endless life they always operate promptly—another one of the five exclusive Earll Catcher and Retriever Features.

Like to know the other four? We'd like to tell you.

C. I. Earll York, Pa.

Canadian Agents:
Railway & Power Engineering Corp., Ltd., Toronto, Ont.
In All Other Foreign Countries:
International General Electric Co., Schenectady, N. Y.

Tools of His Trade

Common law recognizes and upholds the right of a workman to his tools—his basic means of survival and maintenance.

The tools of a business enterprise are no less essential. It must have and use certain instrumentalities to get business, to do business and to hold business.

Having them, it grows and brings forth fruit—provided the tools are intelligently directed.

Deprived of them, it becomes stunted, withers, and eventually dies—no amount of intelligence can save it, lacking means of application.

The prime concern of any business is to get orders. It must have and use personal solicitors and advertising—the twin tools of salesmanship.

And when a business is ordered by its bank to curtail or stop the use of these productive forces—either or both—that business is being deprived of its tools.

Give business the right to progress!

[Published by the *Electric Railway Journal* in co-operation with The American Association of Avertising Agencies]

An Independent Inspection Service
For Electric Railways

Embracing

Progressive Inspection of Cars, Rails, Track Fastenings, etc., from the raw material to the finished product. Our Bulletin No. 26 tells the story—*write for your copy.*

Pittsburgh Testing Laboratory
Inspecting Engineers and Chemists
Branch Offices in the Principal Cities **Pittsburgh, Pa.**

SEARCHLIGHT SECTION

POSITIONS WANTED

A FORMER Eastern man, now connected with a Western road, with seventeen years' railroad experience, fourteen years with a large agency from operative to executive, now desires a connection either as special agent or assistant to special agent. Know the inspection game from end to end including labor, arbitration, employment; superintendent, etc. Some road somewhere needs a man of my type, one that went through the old days and has never learned the new days as far as hours are concerned, as my middle name is still work. PW-583, Electric Railway Journal, Rialto Bldg., San Francisco, Calif.

MANAGER, assistant manager or general superintendent, twenty years' experience in electrical railway work, principally interurban, available August first. Technical. Successful organizer. Tactful in public relations. Very resourceful in rehabilitating property. Energetic and capable executive. Successful record as an economical operator. Prefer connection with electrified steam road or interurban railway. State complete information first letter. PW-586, Electrical Railway Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of transportation, with a proven successful record of nineteen years on city, suburban and interurban properties, solicits correspondence with managers who are in need of a capable, efficient superintendent; successful in dealing with public and labor; recognized as an operating official who gets results; at present with large property; personal reasons for desiring a change. High grade references furnished as to ability to take over any property and get results. PW-568, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

ROADMASTER, twenty years on electric railways, references the best; have handled nearly all kinds of paving; also arc and acetylene welding; have a proven record as trackman. Available any time. PW-585, Electric Railway Journal, 10th Ave. at 36th St., New York.

TRAFFIC AND SCHEDULE ENGINEER

of real ability needed by large company. State fully education and experience.

P-587, Electric Railway Journal
1570 Old Colony Bldg., Chicago, Ill.

FOR SALE

New Light Weight

One Man—Two Man
Double End—Double Truck

SAFETY CAR

Seating Capacity 54

Fully Equipped
Immediate Delivery

F.S.-580 Electric Railway Journal
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FOR SALE

25-Ton All Steel

BALDWIN ELECTRIC LOCOMOTIVE

Fully Equipped
Excellent Condition
Immediate Delivery

FS-566, Electric Railway Journal
10th Ave. at 36th St., New York City

FOR SALE

3—J. G. Brill One Man Safety Cars

Equipped with 2 G. E. No. 67 Motors, G. E. B23 Controls 35 ft. long, single truck, good condition.
Immediate shipment. Further information on request.

WEST VIRGINIA UTILITIES CO.
MORGANTOWN, W. VA.

WANTED

TRUCKS

25 Pair Brill No. 27-G, with 4-ft. or 4-ft. 2-in. wheel base. Give description, location and price.

W-584, Electric Railway Journal
1570 Old Colony Bldg., Chicago, Ill.

FOR SALE

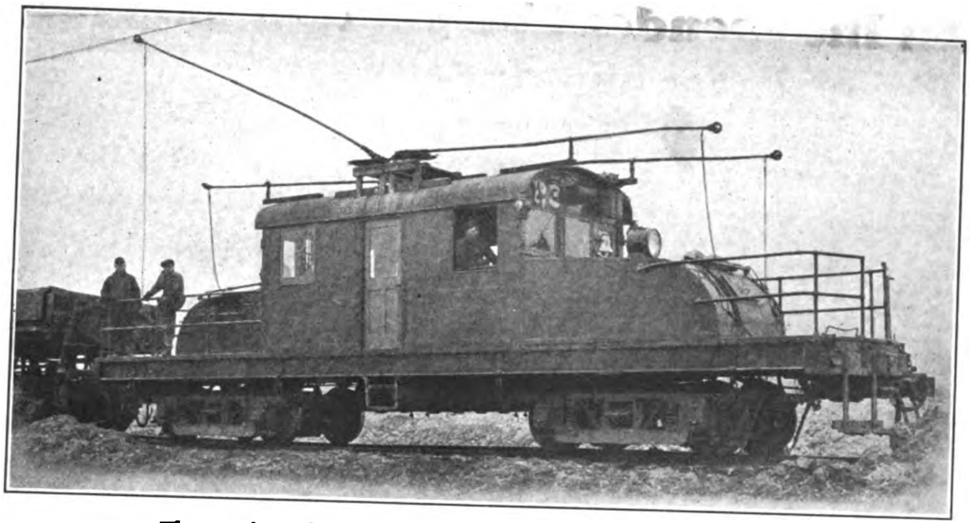
20—Peter Witt Cars

Weight Complete, 33,000 lbs.

Seat 53. 4—G. E. No. 258-C Motors. K-12-H Control. West. Air Taylor Trucks. R.H. Type. Complete.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

FOR SALE



5—50-TON LOCOMOTIVES

Immediate Shipment **Practically New**

These engines are modern design. Portion are standard Baldwin Westinghouse. All in first-class operating condition—some were used only a few months and are virtually as good as new. Westinghouse automatic and straight air brakes. Two compressors, each 50 cu.ft. capacity. Standard MCB couplers.

Trucks—Baldwin. Also Diamond Arch-Bar type. Wheelbase 7 ft. 0 in. Steel wheels 36 in. MCB tread and flange.

Electrical Equipment—consists of four General Electric 150 hp. Also Westinghouse 125 hp.

Code "Lanch"

TRANSIT EQUIPMENT COMPANY, 501 Fifth Avenue, New York

FOR SALE

FREQUENCY CHANGER SETS

1—37½ K.D.A. Frequency Changer Set, 370 v., 25 cycle motor, 2300 v. generator.

2—100 Kw. Frequency Changer Sets, 370/440 v., 25 cy. A. C. motor, 2300 v. A.C. generator.

L. G. VAN NESS
1431 Union Trust Bldg., Cincinnati, O.

"SEARCHLIGHT"

IS

Opportunity

Advertising

—to help you get what you want.

—to help you sell what you no longer need.

Take Advantage Of It

For Every Business Want

"Think SEARCHLIGHT First"

FOR SALE

1—CAR

55 ft. over all, suitable for freight or express, or for locomotive purposes. Excellent condition. 4 W-112 motors. K-34 control. McB. couplers and wheels. Automatic air brakes. D-2 compressor. Baldwin trucks, practically new. Price $3500 f.o.b. Cincinnati.

1431 Union Trust Bldg.
Cincinnati, Ohio.

FOR SALE

1—1200 K.W., D.C. Unit

G.E. Generator, 575 v., 2090 amps., 100 r.p.m., direct-connected to a Rice & Sargent Engine, 28x56x48 in. Complete with 3420 sq.ft. Wheeler Surface Condenser, etc.
Unit less than 10 years old. Located in State of Ohio.

2—300 K.W. Rotary Converters

Westinghouse, 550 v., 545 amps., D.C. 2 ph., 60 cy., 600 r.p.m., Located Long Island, N. Y.

Must move immediately. Will sacrifice
Wire

H. E. Salzberg Co., Inc.
30 Church St., New York.

TO HELP YOU

SELL USED EQUIPMENT

"Searchlight" Advertising

G-2

FOR SALE

MOTOR CAR EQUIPMENT

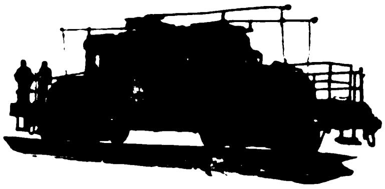
2—4-Motor Car Equipments with double end K-35 control and G.E.-203 50 hp. commutating pole. **Ventilated Railway Motors** in first class condition, subject to inspection. $2,900 for lot f.o.b. cars.

1431 Union Trust Bldg., Cincinnati, Ohio.

FOR SALE

50-Ton Electric LOCOMOTIVE

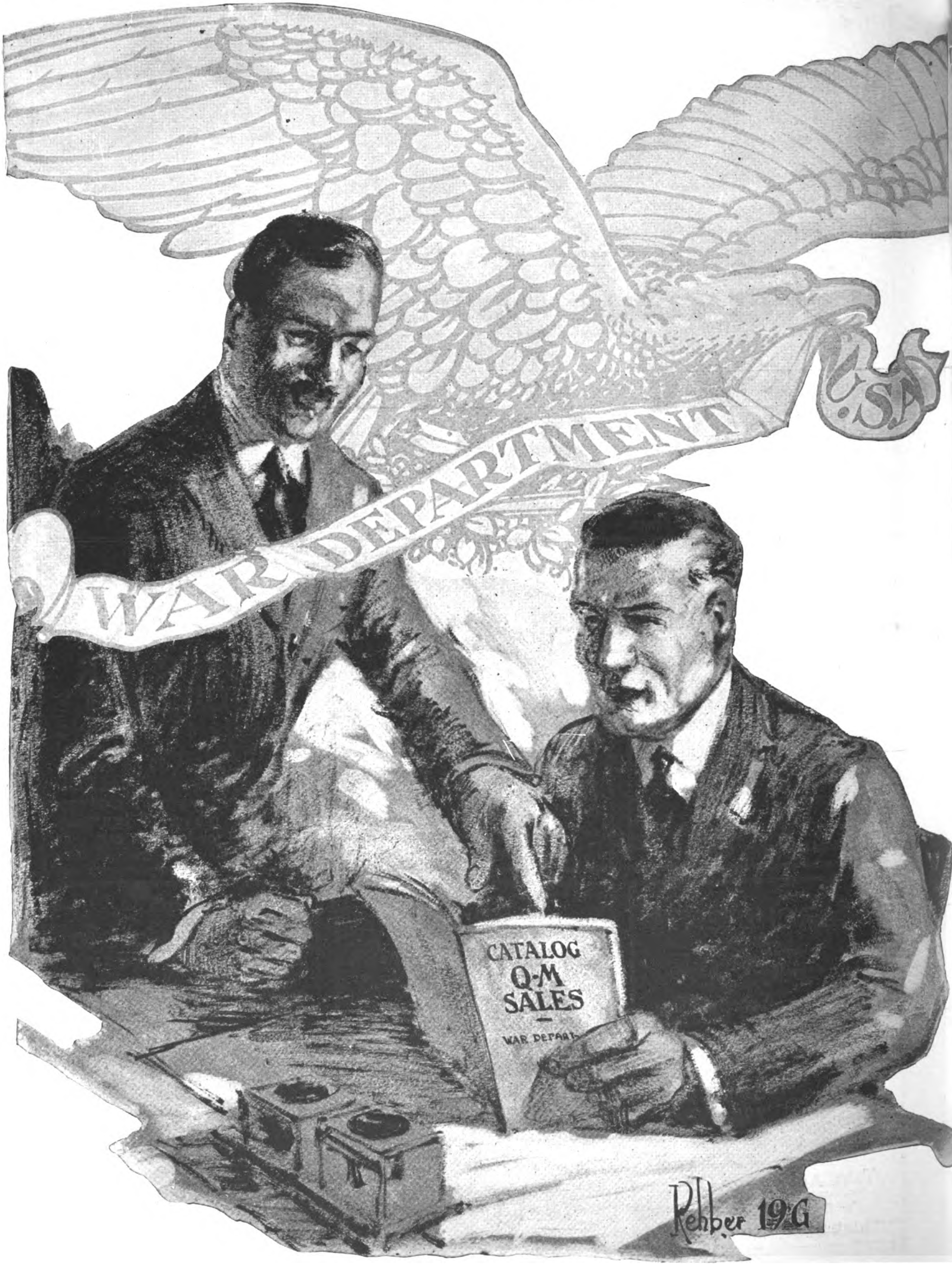
600 Volt—D. C.



Locomotives are complete in every respect and are in excellent condition.

Full Specifications Upon Request

Hydro Salvage Syndicate
Niagara Falls—Ontario


WAR DEPARTMENT
U.S.A.
CATALOG
Q-M
SALES
WAR DEPART
Rehber 19G

As a business man—War Department sales compel your investigation

There are two sides to the Surplus Property situation:

1—The taxpayer's side of the billions of dollars in what financiers call "frozen assets."

2—The business man's (taxpayer too) side of tremendous stocks, which, if suddenly dumped on the market would cause violent price reactions.

At the beginning of 1919 the War Department faced the job of reconciling these two problems. Everyone appreciated the almost Herculean task.

Everybody was interested.

Not without mistakes but with a definiteness that accomplished the disposal of billions of dollars worth of materials at a remarkably low cost, the work of the Director of Sales Office was started.

Then a strange, but very human thing happened.

Because no load was laid on the shoulders of business, a great number of business men have never investigated the Surplus Property sales.

And this indifference has robbed many business men of the opportunity for profitably sharing in this great plan of distribution.

But it is not too late to come in—to investigate what the War Department still has to offer.

Final sales are being planned.

As taxpayers and for their own financial gain, American business men are urged to investigate the sales which are being announced—to appoint personal representatives to inspect the stocks—to carefully apporaise the offerings.

You will find your Government a willing cooperator to clarify any details and assist with your investigation.

The Way to Investigate

Watch your Commercial Business Publication and the Metropolitan Dailies for announcements of specific auction or sealed bid sales.

Send for the Catalog mentioned in the announcement. Check off the items that interest you.

Send a representative to the sale to inspect the materials—in advance, *if possible.*

To ensure you more leeway, send your name and address at once to Major J. L. Frink, Chief, Sales Promotion Section, Room 2515, Munitions Building, Washington, D. C. Advise him the character of materials you are interested in, and catalogs containing such materials will be forwarded you as rapidly as sales are scheduled.

Final commodity sales will begin in September and continue until liquidation of stocks is completed at the Quartermaster Depots in Brooklyn, Chicago, San Antonio and San Francisco. Offerings include a wide range of Quartermaster Supplies, Ordnance Property and smaller quantities of Engineer Property, Chemical Warfare and Medical and Hospital Supplies.

Important sales of Real Estate Buildings, Plants, and Warehouses will be held at Camp Devens, Ayer, Mass.; Camp Dix, N. J.; Ordnance Reserve Depot, Amatol, N. J.; Camp Meade, Md.; Ordnance Reserve Depot, Toledo, O.; Camp Knox, Louisville, Ky., and Camp Lewis, American Lake, Wash Definite dates will be announced later.

Look for the Eagle before you shop.

WAR DEPARTMENT

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Receivers, Aftercoolers
Ingersoll-Rand Co.

Anchors, Guy
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Armature Shop Tools
Elec. Service Supplies Co.

Automatic Return Switch Stand
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

Autos & Busses
The White Co.

Axles
Bemis Car Truck Co.
St. Louis Car Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

Babbitt Metal
Ajax Metal Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Electric Service Supplies Co.
International Register Co., The

Batteries, Dry
Nichols-Lintern Co.

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
A. Gilbert & Sons, B. F. Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

Bearings, Center and Roller Side
Baldwin Locomotive Works
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Heating Co.
Elec. Service Supplies Co.

Benders, Rail
Ry. Track-work Co.

Boilers
Babcock & Wilcox Co., The

Boiler Tubes
National Tube Co.

Bond Testers
Amer. Steel & Wire Co.
Elec. Service Supplies Co.

Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Imp. Co.
Elec. Service Supplies Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Railway Track-work

Bonds, Rail
Amer. Steel & Wire Co.
Elec. Railway Imp. Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse Elec. & M. Co.

Book Publishers
McGraw-Hill Co.

Brackets and Cross Arms (See also Poles, Ties, Posts etc.)
American Bridge Co.
Bates Exp. Steel Truss Co.
Elec. Ry. Equip. Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
Nat'l Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Taylor Electric Truck Co.
Wheel Truing Brake Shoe Co.

Brakes, Brake Systems and Brake Parts
Ackley Brake & Sup. Corp.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
Taylor Electric Truck Co.
Westinghouse Tr. Br. Co.

Bridges & Buildings
American Bridge Co.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse Elec. & M. Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Brushes, Wire Pneumatic
Ingersoll-Rand Co.

Bunkers, Coal
American Bridge Co.

Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.

Bushings
Nat'l Vulcanized Fibre Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.

Cables
(See Wires and Cables)

Cambric Tapes, Yellow & Black Varnish
Irvington Varnish & Ins. Co.

Carbon Brushes
(See Brushes, Carbon)

Car Lighting Apparatus
Elec. Service Supplies

Car Panel Safety Switches
Consolidated Car Heating Co.
Westinghouse Elec. & M. Co.

Cars, Dump
Differential Steel Car Co., Inc.

Cars, Gas Rail
St. Louis Car Co.

Cars, Passenger, Freight Express, etc.
American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Thomas Car Works
Perley A.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Cars, Self-Propelled
General Electric Co.

Castings, Brass, Composition or Copper
Ajax Metal Co.
Baldwin Locomotive Works
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Castings, Funnel
Wharton, Jr. & Co., Inc., Wm.

Castings, Gray Iron and Steel
American Bridge Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Wharton, Jr., & Co., Inc., Wm.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.

Catchers and Retrievers, Trolley
Earll, C. I.
Electric Service Sup. Co.
Ohio Brass Co.
Wood Co., Chas. N.

Catenary Construction
Archbold-Brady Co.

Change Carriers
Cleveland Fare Box Co.
Galef, J. L.

Circuit Breakers
General Electric Co.
Westinghouse Elec. & M. Co.

Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. M. & J. M.
Dossert & Co.
Electric Railway Equip. Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
WestinghouseElec . & M. Co.

Cleaners and Scrapers, Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coils, Armature and Field
Columbia M. W. & M. I. Co.
General Electric Co.

Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines
Cleveland Fare Box Co.
Galef, J. L.
International Register Co. The

Coin Sorting Machines
Cleveland Fare Box Co.
Galef, J. L.

Coin Wrappers
Cleveland Fare Box Co.
Galef, J. L.

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Elec'l Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.

Compressors, Air, Portable
Ingersoll-Rand Co.

Compressors, Gas
Ingersoll-Rand Co.

Condensers
General Electric Co.
Ingersoll Rand Co.
Westinghouse Elec. & M. Co.

Condensor Papers
Irvington Varnish & Ins. Co.

Conduits, Underground
Std. Underground Cable Co.

Connectors, Solderless
Dossert & Co.
Westinghouse Elec. & M. Co.

Connectors, Trailer Car
Consolidated Car Heating Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Controllers or Parts
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Controller Regulators
Electric Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse Elec. & M. Co

Converters, Rotary
General Electric Co.
Westinghouse Elec. & M. Co.

Conveying and Hoisting Machinery
Columbia M. W. & M. I. Co.

Copper Wire
Anaconda Copper Mining Co.

Cord Adjusters
Nat'l Vulcanized Fibre Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roeblings Sons Co., John A.
Samson Cordage Works
Silver Lake Company

Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Cross Arms (See Brackets)

Crossings
Ramapo Ajax Corp.

Crossing Foundations
International Steel Tie Co.

Crossing Frogs and Switches
Ramapo Ajax Corp.
Wharton, Jr., & Co.,Inc.,Wm.

Crossings, Manganese
Indianapolis Switch & Frog Co.
Ramapo Ajax Corp.

Crossing Signals (See Signal Systems, Highway Crossing)

Crossings, Track, (See Track, Special Work)

Crossings, Trolley
Ohio Brass Co.

Curtains and Curtain Fixtures
Brill Co., The J. G.
Edward Co., Inc., The O. M.
Electric Service Supplies Co.
Morton Mfg. Co.

Dealers' Machinery
Electric Equipment Co.
Transit Equipment Co.

Derailing Switches, Tee Rail
Ramapo Ajax Corp.

Destination Signs
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Detective Service
Wish Service, P. Edward

Door Operating Devices
Consolidated Car Heating Co.
National Pneumatic Co., Inc.
Safety Car Devices Co.

Doors and Door Fixtures
Brill Co., The J. G.
General Electric Co.
Hale & Kilburn Corp.

Doors, Folding Vestibule
National Pneumatic Co., Inc.

Draft Rigging, (See Couplers)

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.

Dryers, Sand
Electric Service Supplies Co.

Ears
Ohio Brass Co.

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Railway Track-work Co.

Electrodes, Carbon
Indianapolis Switch & Frog Co.
Railway Track-work Co.

Electrodes, Steel
Indianapolis Switch & Frog Co.
Railway Track-work Co.

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Roeblings Sons Co., J. A.

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Beckwith-Chandler Co.

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Archbold-Brady Co.
Arnold Co., The
Beeler, John A.
Bibbens, J. Rowland
Day & Zimmerman, Inc.
Drum & Co., A L.
Feustel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Ong, Joe R.
Parsons, Klapp, Brinkerhoff & Douglas
Richey, Albert S.
Robinson & Co., Dwight P.
Sanderson & Porter
Shaw, Henry M.
Stevens & Wood, Inc.
Stone & Webster
Wortham, Edwin

Engineers, Inspecting & Chemists'
Pittsburgh Testing Lab.

Engines, Gas, Oil and Steam
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Westinghouse Elec. & M. Co.

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Galef, J. L.
Nat'l Ry. Appliance Co.
Ohmer Fare Register Co.

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Amer. Steel & Wire Co.

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Consolidated Car Fender Co.
Electric Service Sup. Co.
Star Brass Works

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Nat'l Vulcanized Fibre Co.
Westinghouse Elec. & M. Co.

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Flangeway Guards
Godwin Co., Inc., W. S.

Flaxlinum Insulation
Nat'l Ry. Appliance Co.

Floodlights
Electric Service Sup. Co.

Forgings
Carnegie Steel Co.
Columbia M. W. & M. I. Co.

Frogs & Crossings, Tee Rail
Ramapo Ajax Corp.

Frogs, Track. (See Track Work)

Frogs, Trolley
Ohio Brass Co.

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Pittsburgh Electric Furnace Corp.

Fuses and Fuse Boxes
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Consolidated Car Heating Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Fuses, Refillable
Columbia M. W. & M. I. Co.
General Electric Co.

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Power Speciality Co.
Westinghouse Tr. Br. Co.

Gas-Electric Cars
General Electric Co.

Gas Producers
Westinghouse Elec. & M. Co.

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Brill Co., The J. G.

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Carnegie Steel Co.

Gear Cases
Chillingworth Mfg. Co.
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Electric Service Supplies Co.
Westinghouse Elec. & M. Co.

Gears and Pinions
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Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

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General Electric Co.

Generators
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General Electric Co.
Westinghouse Elec. & M. Co.

Girder Rails
Lorain Steel Co., The

Goggles, Safety
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Gongs (See Bells and Gongs)

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Grinding Blocks and Wheels
Railway Track-Work Co.
Seymour Rail Grinder Co., E. P.

Guard Rail Clamps
Ramapo Ajax Corp.

Guard Rails, Tee Rail & Manganese
Ramapo Ajax Corp.

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American Bridge Co.

Guards, Trolley
Electric Service Sup. Co.
Ohio Brass Co.

Hammers, Pneumatic
Ingersoll-Rand Co.

Harps, Trolley
Anderson M. Co., A. & J. M
Bayonet Trolley Harp Co.
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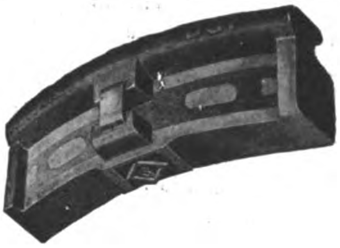

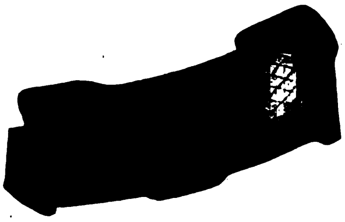

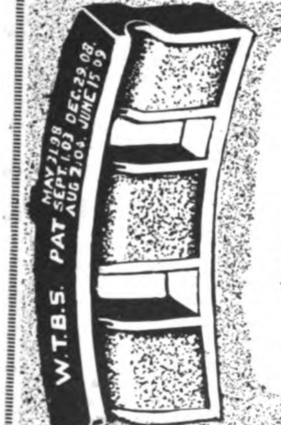
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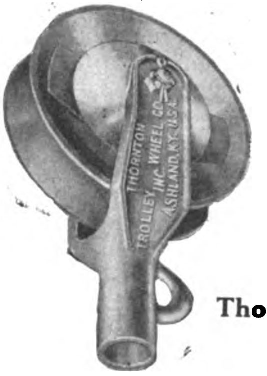

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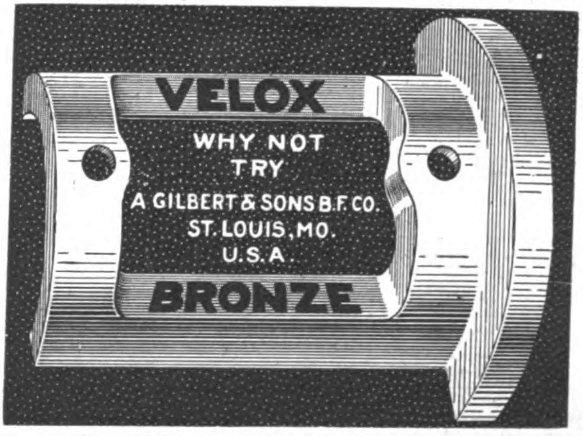
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  - Electric Ry. Equipment Co.
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  - Lapp Insulator Co., Inc.
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  - Buckeye Jack Mfg. Co.
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  - Electric Service Sup. Co.
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  - Electric Service Sup. Co.
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  - Anderson M. Co., A. & J. M.
  - General Electric Co.
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  - Shaw, Henry M.
- **Lightning Protection**
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  - Electric Service Sup. Co.
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  - Archbold-Brady Co.
  - Columbia M. W. & M. I. Co.
  - Dossert & Co.
  - Electric Ry. Equipment Co.
  - Electric Service Sup. Co.
  - English Electric Co.
  - General Electric Co.
  - Hubbard & Co.
  - Westinghouse Elec. & M. Co.
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  - Wharton, Jr. & Co., Inc., Wm.
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  - Baldwin Locomotive Works
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  - Westinghouse Elec. & M. Co.
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  - Galena-Signal Oil Co.
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  - Bemis Car Truck Co.
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  - Ramapo Ajax Corp.
- **Manganese Steel, Special Track Work**
  - Indianapolis Switch & Frog Co.
  - Wharton, Jr., & Co., Inc., Wm.
- **Manganese Steel Switches, Frogs and Crossings**
  - Ramapo Ajax Corp.
- **Motor Buses (See Buses, Motor)**
- **Motor Leads**
  - Dossert & Co.
- **Motormen's Seats**
  - Brill Co., The J. G.
  - Electric Service Sup. Co.
  - Wood Co., Chas. N.
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  - Westinghouse Elec. & M. Co.
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  - General Electric Co.
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  - Columbia M. W. & M. I. Co.
  - Hubbard & Co.
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- **Packing**
  - Electric Service Sup. Co.
  - Powers Specialty Co.
  - Westinghouse Tr. Br. Co.
- **Paints and Varnishes, Preservative**
  - Beckwith-Chandler Co.
  - Dixon Crucible Co., Joseph
- **Paints and Varnishes for Woodwork**
  - Ackley Brake & Sup. Co.
  - Beckwith-Chandler Co.
  - National Ry. Appliance Co.
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  - Ingersoll-Rand Co.
- **Paving Guards, Steel**
  - Godwin Co., Inc., W. S.
- **Paving Material**
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  - Ohio Brass Co.
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  - Electric Service Sup. Co.
  - General Electric Co.
  - Wood Co., Chas. N.
- **Pinions (See Gears)**
- **Pins, Case Hardened, Wood and Iron**
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  - Electric Service Sup. Co.
  - Ohio Brass Co.
  - Westinghouse Tr. Br. Co.
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  - National Tube Co.
- **Pipe Fittings**
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  - Westinghouse Tr. Br. Co.
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  - Hubbard & Co.
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  - International Creosoting & Construction Co.
  - Page & Hill Co.
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  - Bell Lumber Co.
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  - Bayonet Trolley Harp Co.
  - Columbia M. W. & M. I. Co.
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  - Nuttall Co., R. D.
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  - National Tube Co.
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  - Buda Company
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  - Okonite Co.
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  - Nat'l Ry. Appliance Co.
- **Pressure Regulators**
  - General Electric Co.
  - Westinghouse Elec. & M. Co.
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  - Ingersoll-Rand Co.
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  - Ingersoll-Rand Co.
- **Punches, Ticket**
  - Bonney-Vehslage Tool Co.
  - International Register Co., The
  - Wood Co., Chas. N.
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  - Ramapo Ajax Corp.
- **Rail Joints**
  - Carnegie Steel Co.
- **Rail Joints, Welded**
  - Indianapolis Switch & Frog Co.
- **Rail Grinders (See Grinders)**
- **Railway Paving Guards Steel**
  - Godwin Co., Inc., W. S.
- **Railway Safety Switches**
  - Consolidated Car Heating Co.
  - Westinghouse Elec. & M. Co.
- **Railway Welding (See Welding Processes)**
- **Rattan**
  - Brill Co., The J. G.
  - Electric Service Sup. Co.
  - Hale & Kilburn Corp.
  - Heywood-Wakefield Co.
  - McGuire Cummings Mfg. Co.
  - St. Louis Car Co.
- **Reclaimers, Waste and Oil**
  - Oil & Waste Saving Machine Co.
- **Registers and Fittings**
  - Brill Co., The J. G.
  - Electric Service Sup. Co.
  - International Reg. Co., The
  - Ohmer Fare Register Co.
  - Rooke Automatic Reg. Co.
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  - Amer. Steel & Wire Co.
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  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
- **Repair Work (See also Coils)**
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - Westinghouse Elec. & M. Co.
- **Replacers, Car**
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
- **Resistance, Grid**
  - Columbia M. W. & M. I. Co.
- **Resistance, Wire and Tube**
  - General Electric Co.
  - Westinghouse Elec. & M. Co.
- **Resistances**
  - Consolidated Car Heating Co.
- **Retrievers, Trolley (See Catchers and Retrievers, Trolley)**
- **Rheostats**
  - General Electric Co.
  - Westinghouse Elec. & M. Co.
- **Sanders, Track**
  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
  - Nichols-Lintern Co.
  - Ohio Brass Co.
- **Sash Fixtures, Car**
  - Brill Co., The J. G.
- **Sash, Metal, Car Window**
  - Hale & Kilburn Corp.
- **Scrapers, Track (See Cleaners and Scrapers, Track)**
- **Screw Drivers, Rubber Insulated**
  - Electric Service Sup. Co.
- **Seating Materials**
  - Brill Co., The J. G.
- **Seats, Bus**
  - Hale & Kilburn Corp.
  - Heywood-Wakefield Co.
  - St. Louis Car Co.
- **Seats, Car (See also Rattan)**
  - Brill Co., The J. G.
  - Hale & Kilburn Corp.
  - Heywood-Wakefield Corp.
  - St. Louis Car Co.
- **Second-Hand Equipment**
  - Electric Equipment Co.
- **Shades, Vestibule**
  - Brill Co., The J. G.
- **Shovels**
  - Hubbard & Co.
- **Shovels, Power**
  - Brill Co., The J. G.
- **Signals, Car Starting**
  - Consolidated Car Heating Co.
  - Electric Service Sup. Co.
  - Nat'l Pneumatic Co., Inc.
- **Signals, Indicating**
  - Nichols-Lintern Co.
- **Signal Systems, Block**
  - Electric Service Sup. Co.
  - Nachod Signal Co., Inc.
  - Union Switch & Signal Co.
  - U. S. Electric Signal Co.
  - Wood Co., Chas. N.
- **Signal Systems, Highway Crossing**
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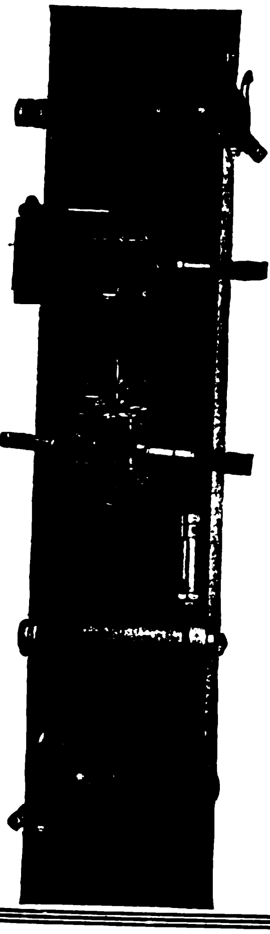

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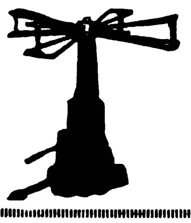

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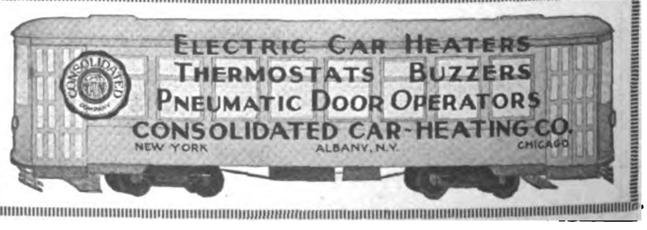

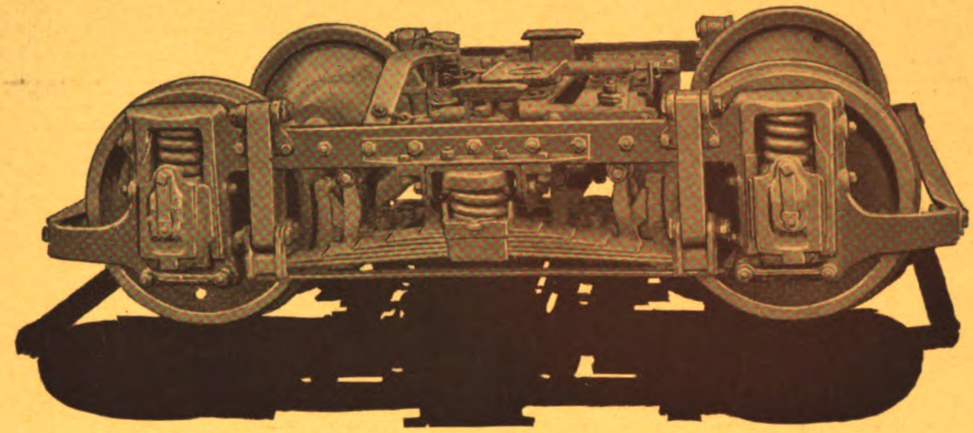

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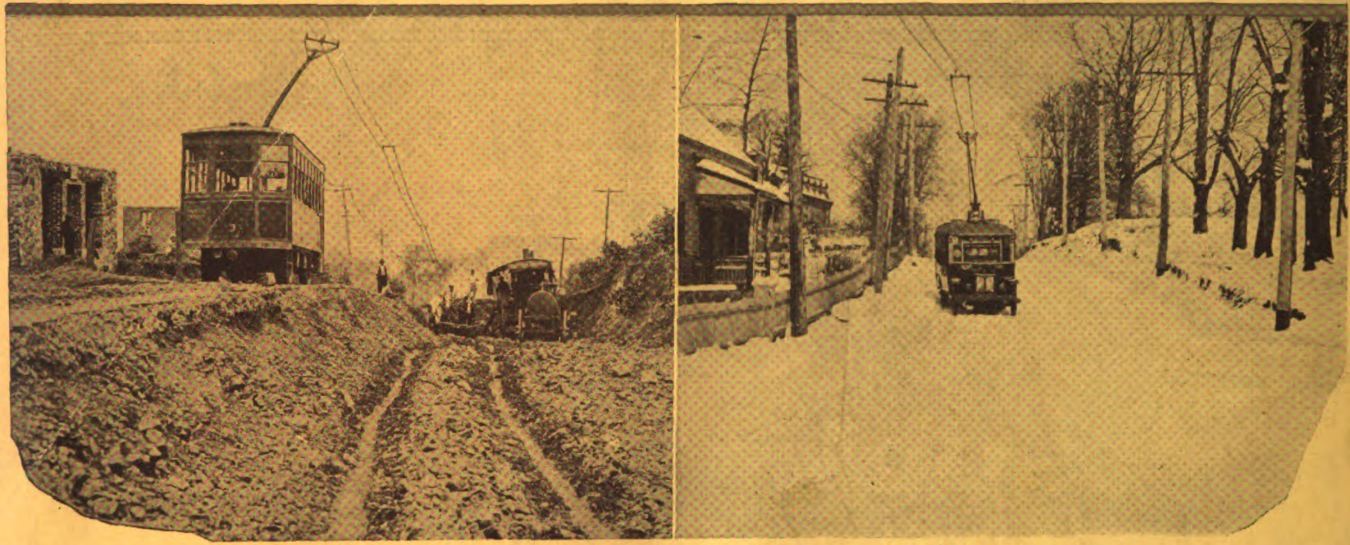

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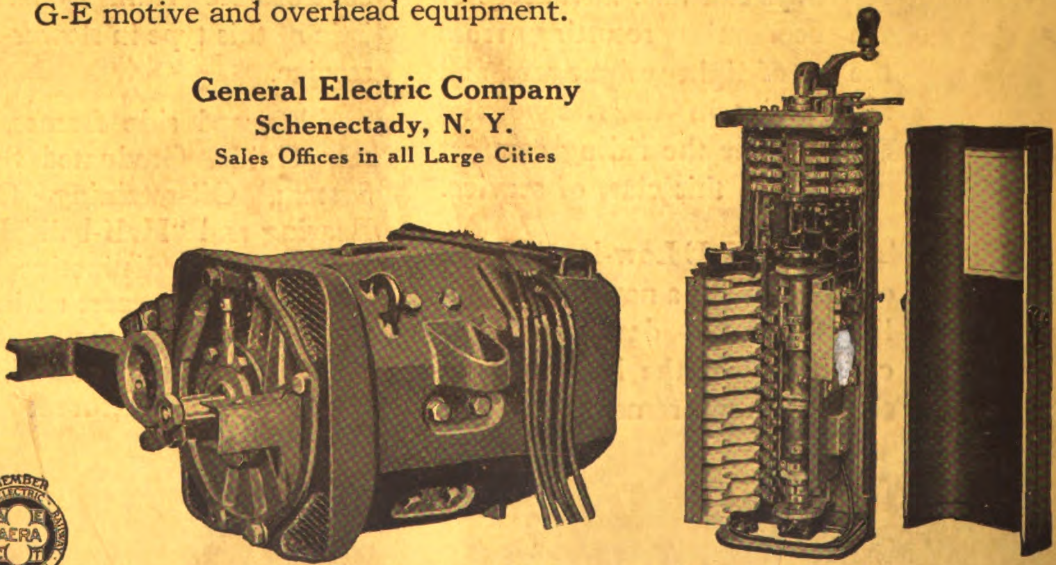

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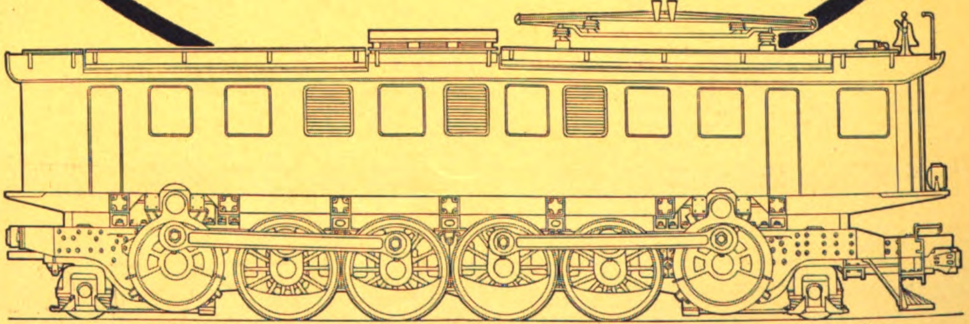

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THE sixty members of this department devote themselves to the interests of our advertisers and prepare about 50 per cent of the advertising seen in the McGraw-Hill publications. The department consists of a service division for planning a campaign from its initial stages to the final appearance in the paper, advertising writers who are thoroughly acquainted with the various fields, and artists who are specially trained in handling construction, railway, industrial and electrical subjects. Copywriters visit the plants of advertisers for the purpose of rendering counsel and collecting information to be worked into copy. Our own expert photographers secure installation views of manufacturers' products. Besides these, our field photo service is in constant communication with more than 1,200 commercial photographers located in all parts of the country.

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Electrical World — Electrical Merchandising
Journal of Electricity and Western Industry
(*Published in San Francisco*)
Industrial Engineer
(*Published in Chicago*)
American Machinist—European Edition
(*Published in London*)

Number of copies printed, 5,925

The annual subscription rate is $4 in the United States, Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala and Paraguay. Extra foreign postage to other countries $3 (total $7 or 29 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 20 cents.

Change of Address—When change of address is ordered the new and the old address must be given, notice to be received at least ten days before the change takes place.

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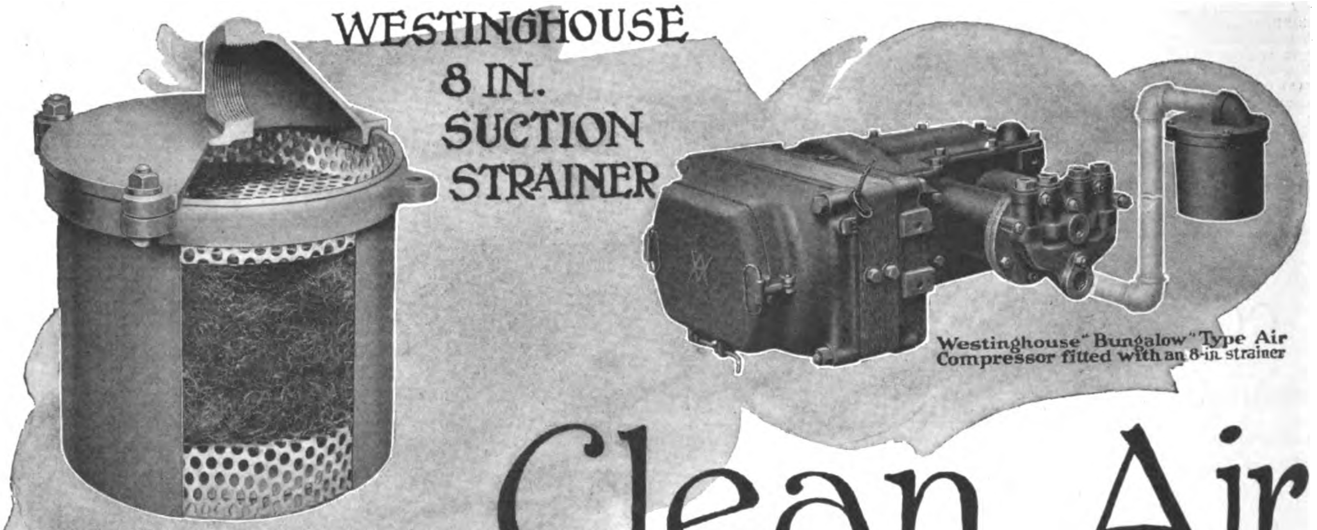


Westinghouse "Bungalow" Type Air Compressor fitted with an 8-in. strainer

Clean Air

will prolong the life of

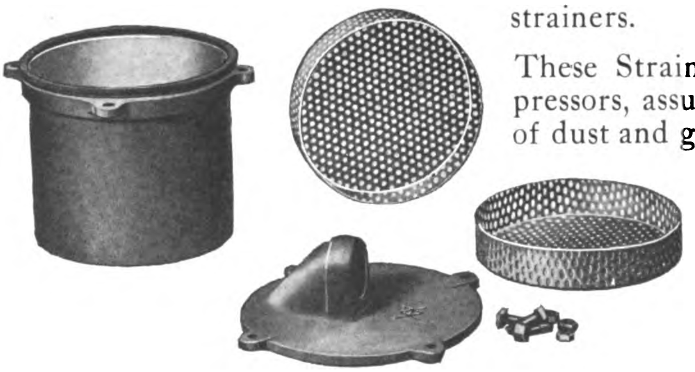
Your Compressors

N Air Strainer is a small item—until you figure out just what it means in terms of compressor service.

After that you will not only be particular to see that the strainers on your car compressors are always in the best working condition but you will insist that the strainers be of the most efficient type—Westinghouse 8-inch Suction strainers.

These Strainers, applicable to all types of compressors, assure an intake of air that is always free of dust and grit—*Clean Air!*

Compressors thus protected give smoother performance and longer service, and cost less to maintain.



Westinghouse Traction Brake Company
General Office and Works: Wilmerding, Pa.

OFFICES:

Boston, Mass.
Chicago, Ill.
Columbus, O.
Denver, Colo.
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Mexico City
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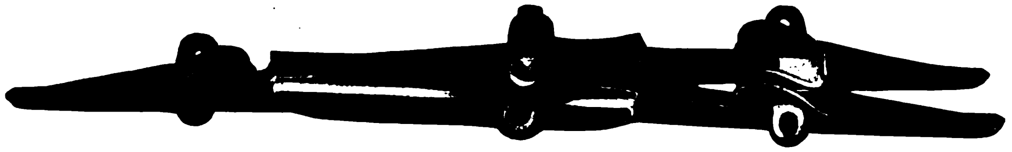
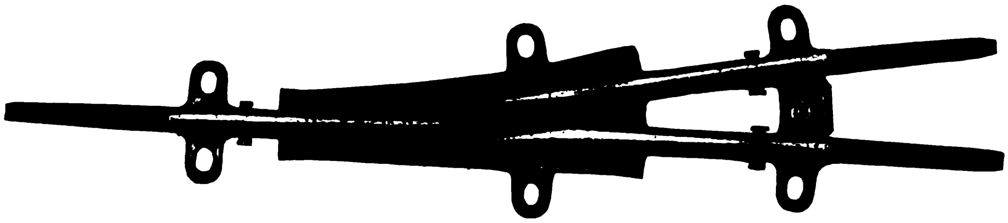
New York
Pittsburgh
Washington
Seattle
San Francisco

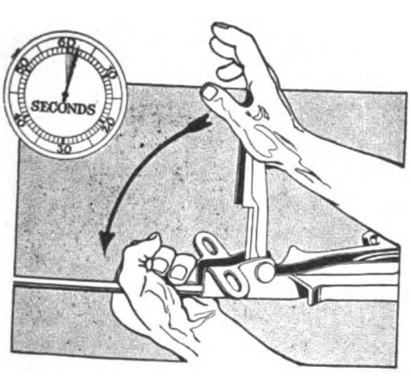
TRADE MARK

WESTINGHOUSE TRACTION BRAKES





The Trolley Wheel Rides on its Groove through O-B Type BC Frogs



O-B Patented Cam Tips permit quick installation of the wire in Frogs, Cross-overs, and Section Insulators without the use of nuts or bolts. The lineman only needs a tool for peening the lips snugly around, under and against the trolley wire. The operation on each tip requires but 40 seconds.

The runners on BC Frogs overlap so that the trolley wheel rides all the way on its groove, whether straight ahead or turn-out. The wheel flanges do not touch the pan. They do not cut a path through the Frog either on straight line or turn-out.

The Frog can be placed nearer to switch point, thus saving the wear on main line and turn-out trolley wire ordinarily caused by the drag of the trolley wheel. This means a more advantageous placing of the Frog and longer life of the Frog body and adjacent trolley wires. Placing a Frog nearer the switch point also permits a better alignment of trolley wires over curve tracks.

The beveled edge of the single approach end runner permits an easy transfer of the trolley wheel to the curve trolley wire. This transfer occurs as soon as possible after the car is on the curve tracks to permit a rolling, and not a crosswise, drag of the trolley wheel.

The wheel is guided smoothly onto and off the BC Frog with the regular O-B patented Cam Tips.

The Ohio Brass Co.
Mansfield, Ohio, U.S.A.

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA

New York Philadelphia Pittsburgh Charleston, W. Va. Chicago Los Angeles San Francisco Paris, France

Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators

Insurance plus
Marsh & McLennan Service

Additions and Betterments

When plans are taking shape for additions and betterments, you can profitably employ the services of Marsh and McLennan engineers.

They enable you to safeguard profits, eliminate hazards and reduce insurance cost.

Business executives of many of our large corporations have used this service profitably.

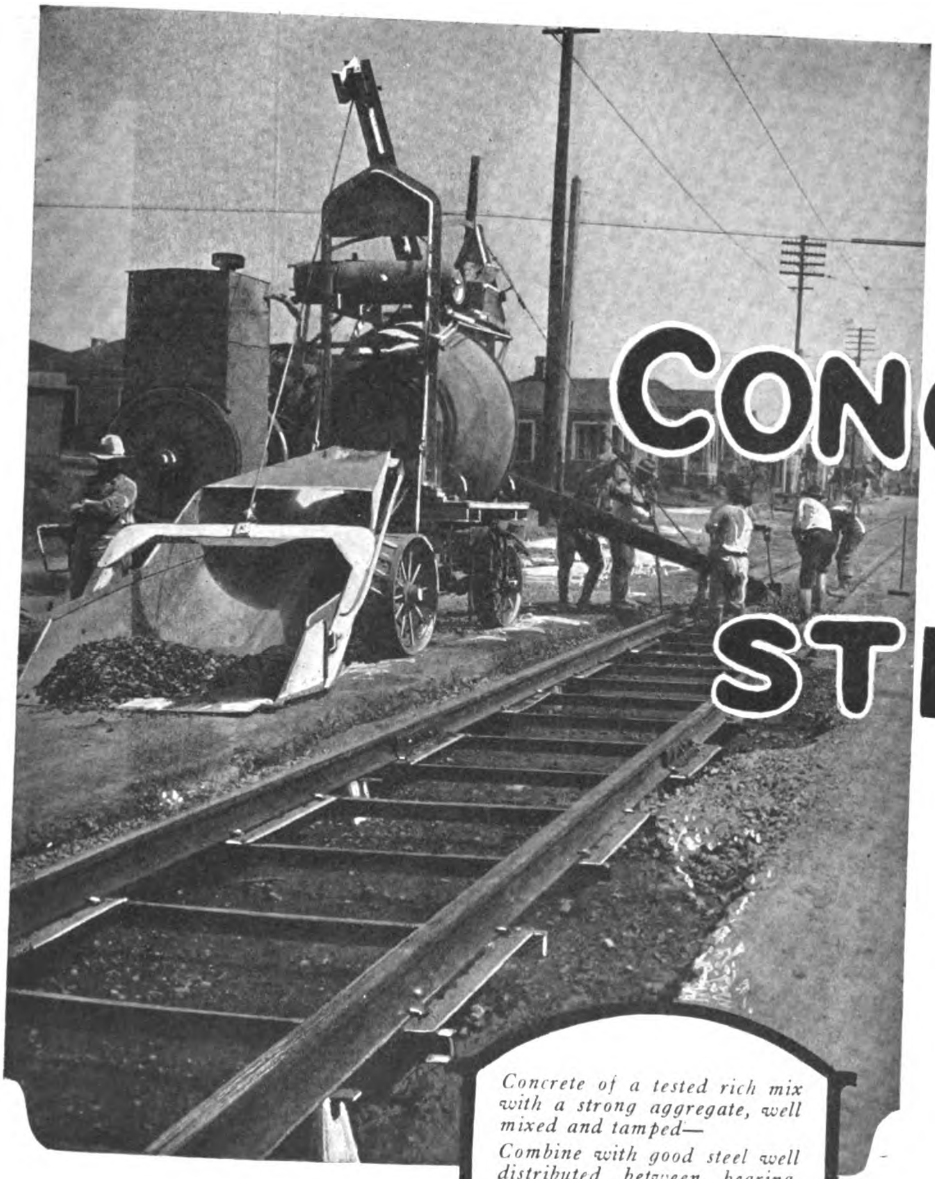
MARSH & McLENNAN
175 W. Jackson Blvd. Chicago, Ill.

Minneapolis
New York
Detroit

Denver
Duluth
Columbus

San Francisco
Seattle
Cleveland

Winnipeg
Montreal
London



Concrete of a tested rich mix with a strong aggregate, well mixed and tamped—

Combine with good steel well distributed between bearing, reinforcement and tie members.

These are the logical permanent materials for the foundation of the best paved track.

There is nothing in such construction to absorb water; to start cracks nor to rot and undermine the rail and joints.

When you hear that such construction is lower in first cost than wood tie construction, the rumor deserves intensive investigation.

Write, or wire, for prices definite shipping date, guaranteed freight rate, and folder on "Costs, Methods and Best Practice in Steel Tie Track Construction."

All Permanent Materials Make Long Lived Track

The International Steel Tie Company
Cleveland, Ohio
Canadian Representatives
Sarnia Bridge Company, Limited
Sarnia, Ontario

Steel Twin Tie Track

Ajax Arc Welder

Low Operating and Maintenance Costs Favor the Ajax Arc Welder

Just what you want in any piece of machinery, particularly a welder—easy operation, speed, efficiency, thoroughness, low cost of operation and maintenance.

It's portable, built for two-man operation. It makes deep strong welds that penetrate right into the rail and last. Operates even with very low trolley voltages. Its price puts it within the reach of every company.

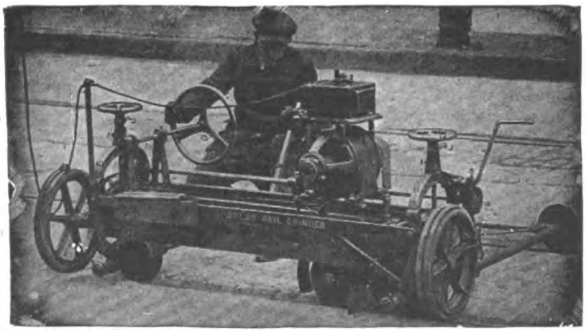
Atlas Rail Grinder

The team-mate of the Ajax Welder. Designed to follow up welders, to remove surplus metal. It is light, fast and efficient, very simple to operate. The price is moderate.

These two machines provide an inexpensive and effective means of keeping old track in first class condition. It pays to have smooth track —ask your repair shop foreman what cupped joints and broken rails do *to* the delicate parts of cars. Then ask our nearest representative what the Ajax Welder and Atlas Grinder can do *for* them.

Atlas Rail Grinder

"UNIVERSAL"
Rotary Track Grinder



"RECIPROCATING"
Track Grinder

RAILWAY TRACK-WORK COMPANY

3132-48 E. Thompson St., Philadelphia, Pa.

AGENTS:

Chas. N. Wood Co.
Boston

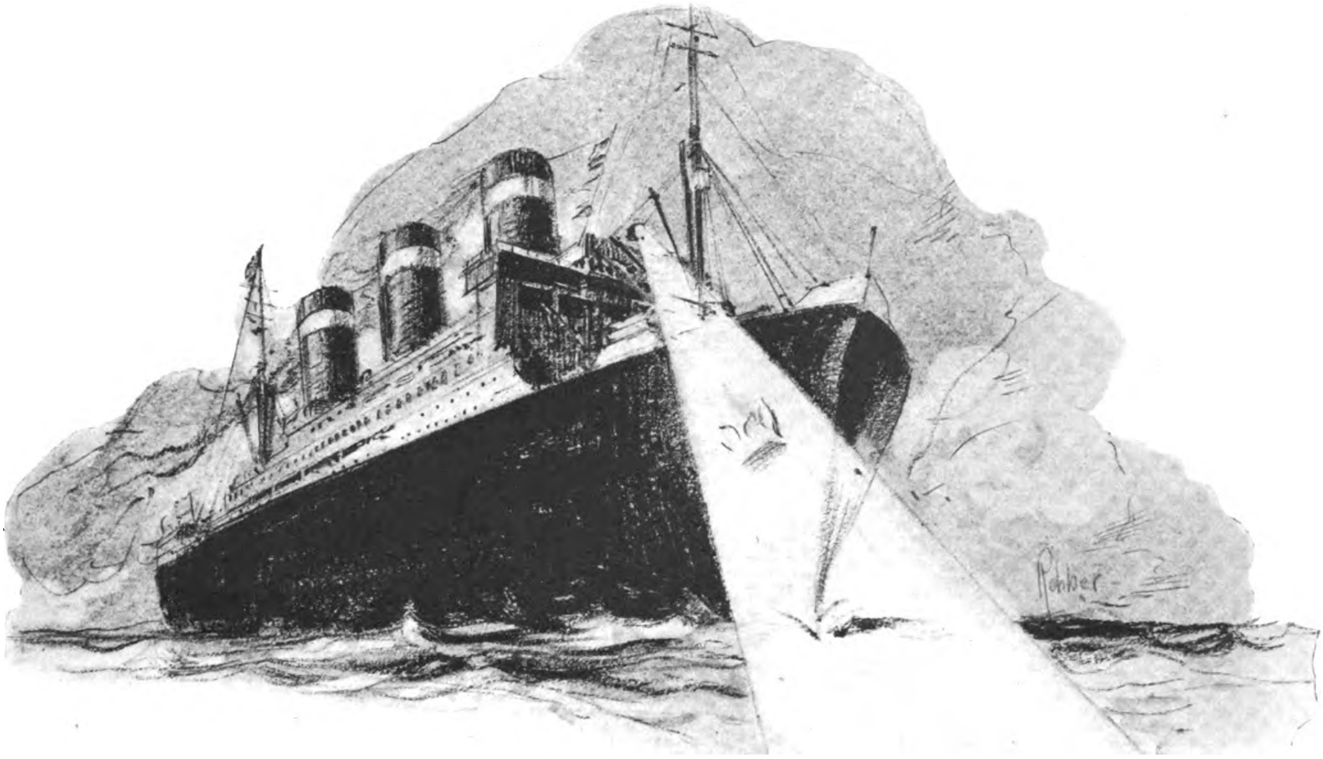
Electrical Engineering & Mfg. Co.
Pittsburgh

Atlas Railway Supply Co.
Chicago

Walter M. Graham, Toronto

P. W. Wood
New Orleans

Equipment & Engineering Co.
London



When the Leviathan comes in

her powerful searchlight helps
to pick the safety way

GOLDEN GLOW
ESSCO

GOLDEN-GLOW HEADLIGHTS

fill the same requirement for interurban cars

Darkness holds no terrors for the motorman behind the Golden Glow Headlight. Like the liner's searchlight, it picks out and illuminates the most obscure places.

That characteristic beam of soft, yellow light gives a less dazzling glare to blind approaching traffic. It is safer in every way, than the ordinary type of headlight.

Golden Glow Headlights on your cars are aids to safety and at the same time advertisements of superior service.

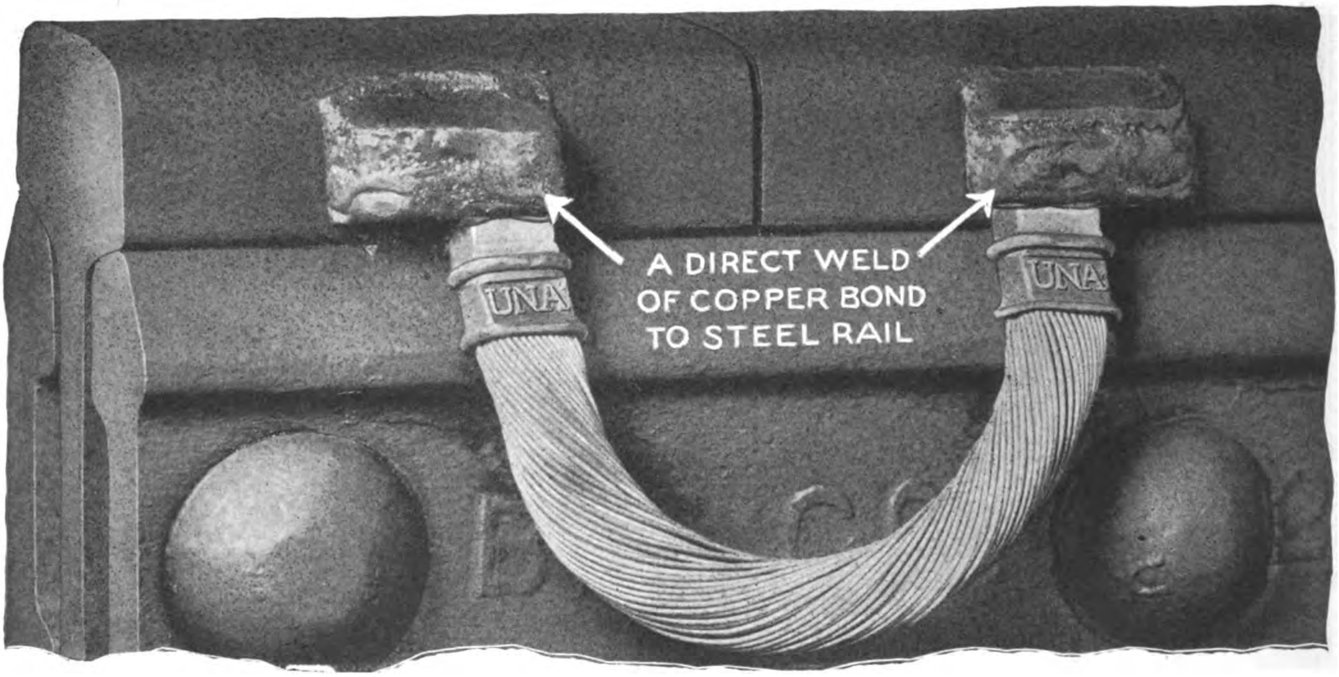
Our data sheets give full details.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA	NEW YORK	CHICAGO
17th and Cambria Streets	50 Church Street	Monadnock Bldg.

Branch Offices: **Boston, Scranton, Pittsburgh**
Canadian Distributors:
Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver



The Simplicity of UNA Bonding

Probably no one appreciates the simplicity of UNA Bonding quite as much as the welding operator. With UNA Bonds he is able to make good welds continuously because he can see and judge the weld as he forms it in the mold. And when the bond is completely welded to the rails he has the satisfaction of actually knowing that it is a good job.

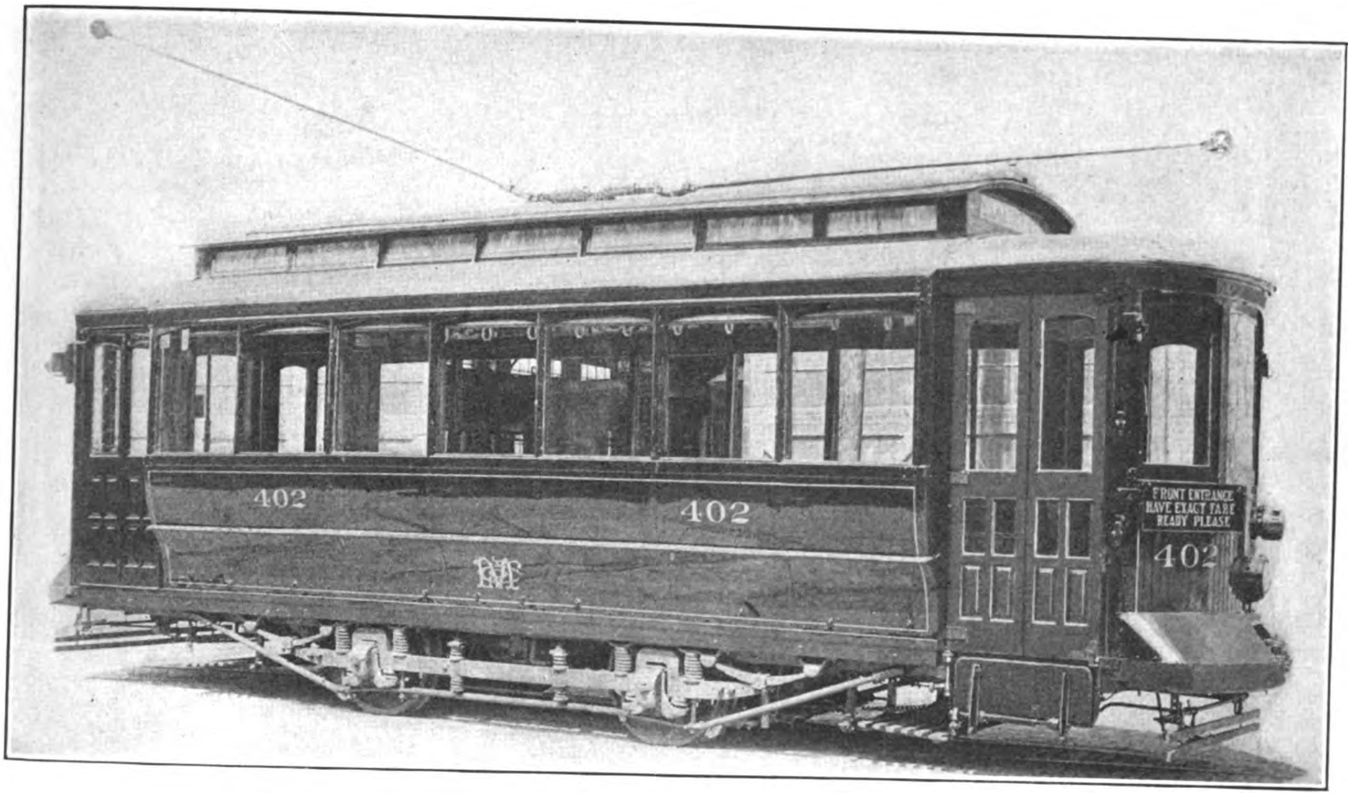
In UNA Bonding it is not necessary to grind the rails. The all copper bond is placed in a mold which can be readily clamped to the rails. Then the operator draws an electric arc. With this source of heat he melts UNA Metal (copper alloy) into the mold and combines it with the bond strands to form the finished head. Just as soon as the mold is full the bond head is welded to the rail. During this operation, the welding of copper to steel rail and the union of the bond strands into the head can be plainly seen.

UNA Bonds are installed rapidly. It only requires about one minute to actually weld a 4/0 bond to the rails. This makes the cost low, as a large number of bonds can be installed per day.

By the direct weld of copper bond to steel rails a path of copper is formed from rail to rail. Since copper alone carries the current, full bonding value is realized, as the conductivity and power savings are a maximum. This excellent conductivity is well protected against the wear and tear of traffic conditions, owing to the great strength of the weld of copper bond to the rails. As an indication of this strength many tests have shown that 25,000 to 32,000 pounds steady force will barely shear through one bond head.

Specify UNA Rail Bonds

RAIL WELDING & BONDING COMPANY, Cleveland, Ohio



REMODELED!

Lehigh Valley Transit Company converts for one-man service with

NATIONAL PNEUMATIC

Door and Step Equipment

Here is a genuine case of economy—a lot of single-truck cars once ***considered obsolete*** and now found useful again when properly rehabilitated.

You can read the whole story in a recent issue of the Electric Railway Journal. The outstanding feature is the use of National Pneumatic Door Engines, to make possible one-man operation with safety, with speed and with convenience.

Let us show you the possibilities.

National Pneumatic Company, Inc.

Designers, Builders and Installers

Door and Step Control
Door and Step Operating Mechanisms
Motorman's Signal Lights
Safety Interlocking Door Control
Multiple Unit Door Control

50 Church Street, New York
Colonial Trust Bldg., Philadelphia
McCormick Bldg., Chicago
Works: Rahway, N. J.

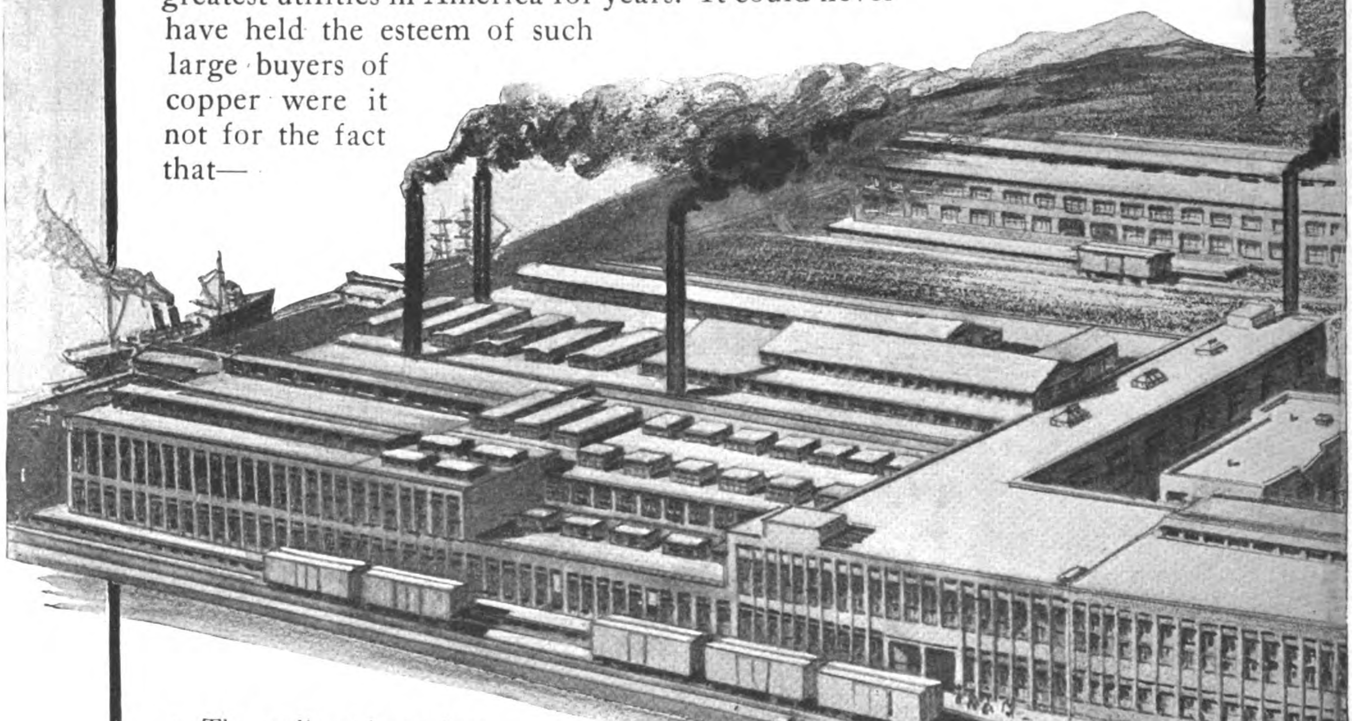
Manufactured in Canada by
Dominion Wheel & Foundries, Ltd., Toronto, Ont.

INSTITUTIONAL PRESTIGE

The Bank of England? The Federal Reserve? What do they mean to those who know nothing of what they represent? And what do they *not* mean to those who *do* know them?

Thus it is with an industrial institution. It means much, or nothing at all, according with one's knowledge or lack of knowledge of what it represents—its plant facilities and potentials, its buying power, its ability to render service and to achieve important economies.

The American Copper Products Corporation has served many of the greatest utilities in America for years. It could never have held the esteem of such large buyers of copper were it not for the fact that—



a. The quality of its product,
b. The price at which its product is sold,
c. The service it renders,

are all equal, if not superior, to the best that American manufacturing accomplishment has to offer.

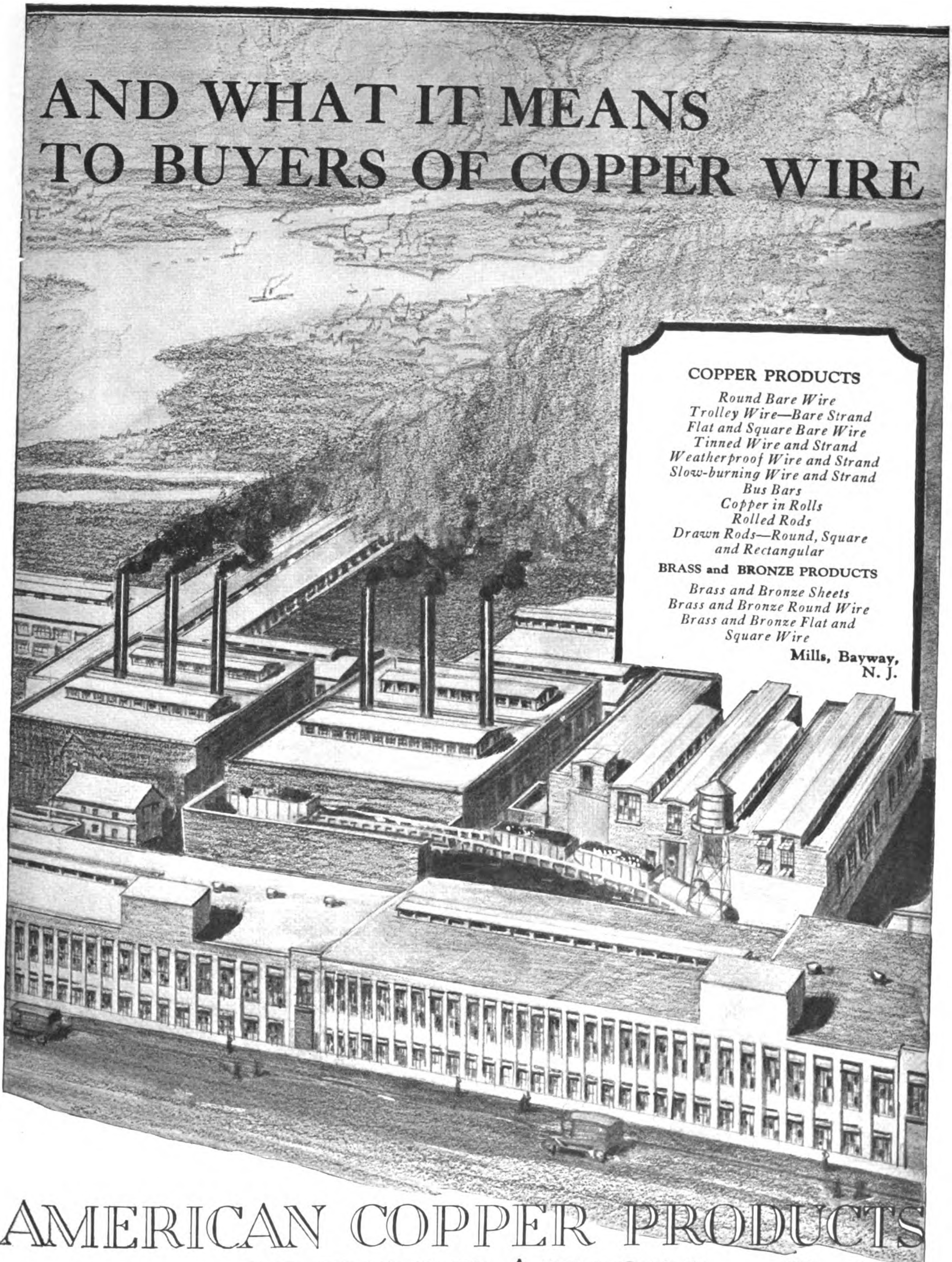
There are compelling reasons for this—sound economic reasons—which we desire all buyers of copper wire to understand.

In succeeding announcements we shall try to make these reasons plain and show the sort of foundation upon which institutional prestige has been built in our case.

AMERICAN COPPER PRODUCTS CORPORATION

Trade Mark

233 BROADWAY NEW YORK



AND WHAT IT MEANS
TO BUYERS OF COPPER WIRE

COPPER PRODUCTS

Round Bare Wire
Trolley Wire—Bare Strand
Flat and Square Bare Wire
Tinned Wire and Strand
Weatherproof Wire and Strand
Slow-burning Wire and Strand
Bus Bars
Copper in Rolls
Rolled Rods
Drawn Rods—Round, Square and Rectangular

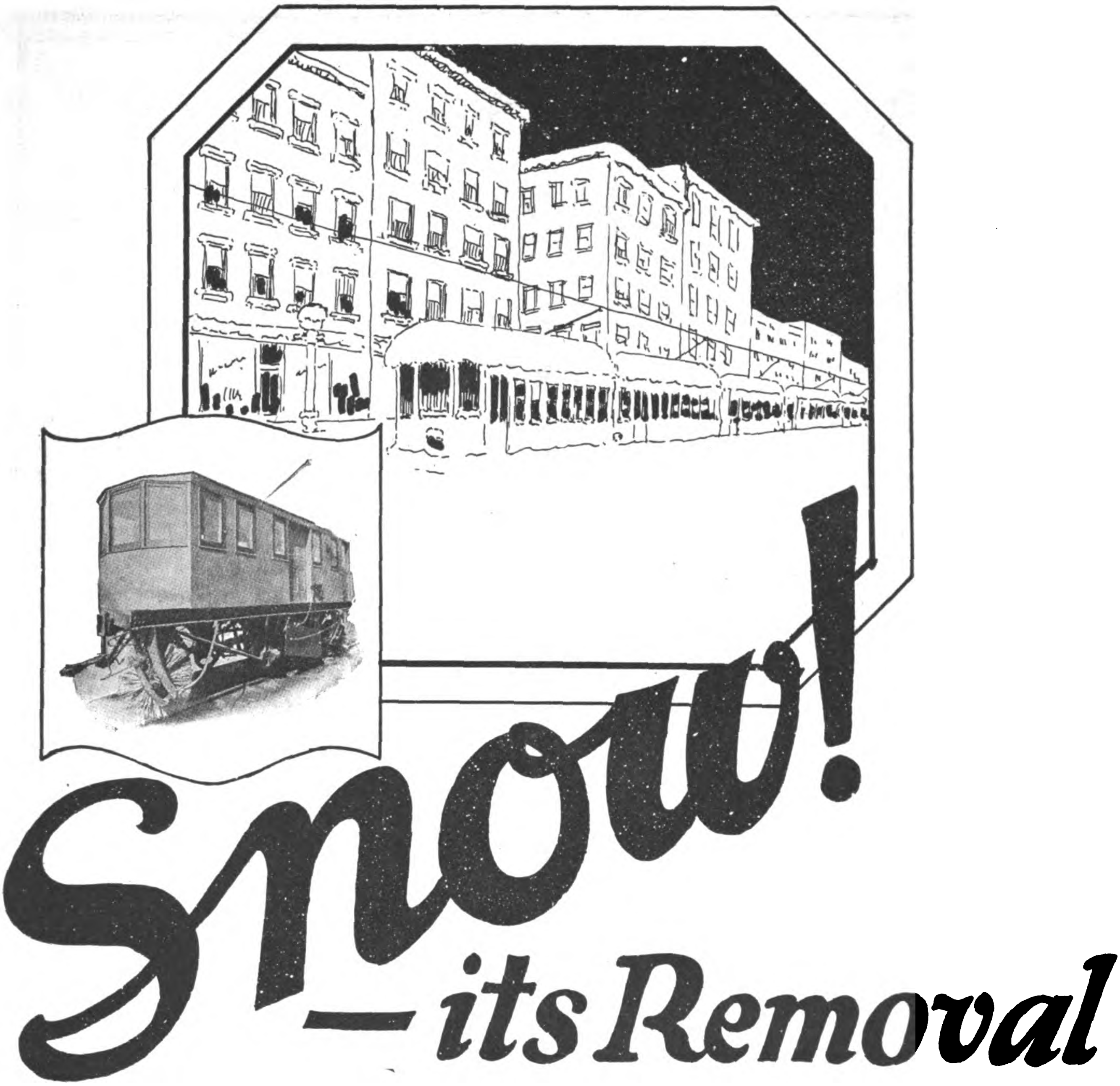
BRASS and BRONZE PRODUCTS

Brass and Bronze Sheets
Brass and Bronze Round Wire
Brass and Bronze Flat and Square Wire

Mills, Bayway, N. J.

AMERICAN COPPER PRODUCTS
CORPORATION
233 BROADWAY NEWYORK

Trade Mark

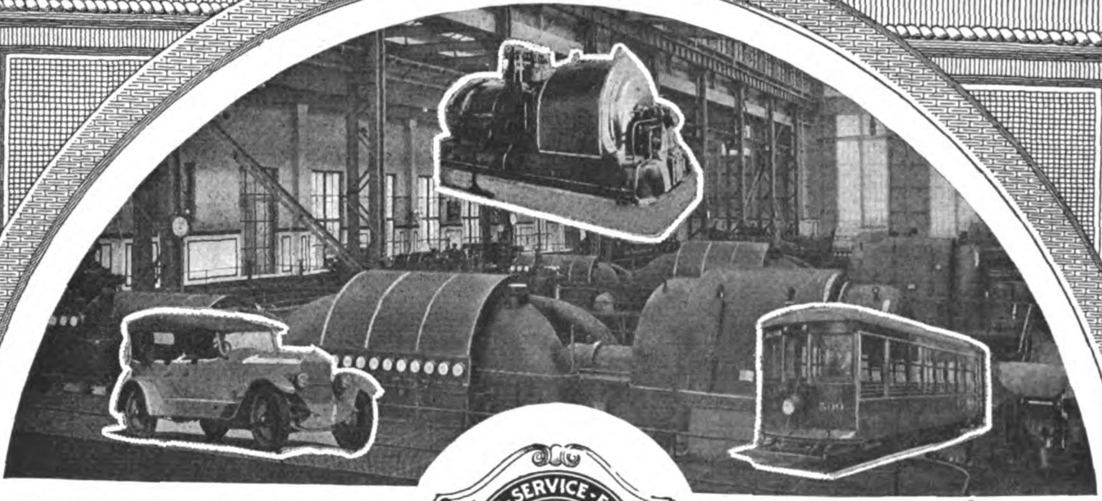


As you read this your immediate problems may not, probably don't in fact, include snow. Yet in the back of your head you undoubtedly are lining up a plan for your next Winter's campaign for keeping tracks open and headways unimpaired. You're not going to wait for snow before you get ready to fight it.

Let us, therefore, remind you that approximately ninety-five per cent of all the electric snow sweeping equipment used in the United States and Canada is of McGuire-Cummings make. McGuire-Cummings sweepers *keep* tracks clear. When it starts to snow they start to sweep—that's all there is to it. Depend upon McGuire-Cummings sweepers for the solution of your snow problem next Winter.

McGUIRE-CUMMINGS MFG. CO.
General Offices
111 West Monroe St., Chicago, Ill.

City and Interurban Cars and Trucks, Safety Cars, Combination and Work Cars,
Snow Sweepers, Electric Locomotives



The Logic of Lubrication

In the operation of cars, engines and power transmission units, lubrication is first, last and always a a *necessity*. It is not a matter of choice; without lubrication, your equipment is powerless—worthless.

But the quality and efficiency of your lubrication *is* a matter of choice. Not only the service you secure from equipment, but its own length of life, depends upon your selection.

The first cost of high-grade lubricants naturally must be more than that of the ordinary kinds, due to the higher priced materials and more complete processes that enter into their manufacture. The question to you must be, "Are they worth the difference?"

What is the opinion of the best engineering authorities on this subject? What is the advice given in the instruction book when you bought your automobile? *"Use the very best lubricant obtainable—it will pay you many times its difference in cost."* The more expensive the type of machine, the more truly this counsel applies.

Galena Oils are the highest grade street railway lubricants manufactured. Their matchless efficiency and ultimate economy are shown in their splendid service on hundreds of electric railways and power plants in all parts of the United States.

These properties do not consider Galena Oils a luxury, but *Galena lubrication a necessity* to efficient operation. The small difference in cost is not looked upon as an expense, but as an *investment,* that has invariably returned large dividends in better service and decreased maintenance costs.

"More miles to the pint,
Better service to the mile!"

Galena-Signal Oil Company
New York - Franklin, Pa. Chicago
and offices in principal cities

For higher standards in motor maintenance

Use your G-E Catalogs
RAILWAY SUPPLIES

**Insulations cut to fit—
Buy them by the *carton***

G-E armature insulations are now cut to fit and furnished ready for the winder's use. They exactly duplicate, in quality and fit, those used in the original armature.

These insulations are much more economical than bulk materials cut as needed. They are supplied in individual cartons—just enough to re-insulate a particular armature. There is no waste.

And G-E coils, a complete set for a G-E motor, are also packaged now—the last word in quality renewals for a dependable maintenance job.

General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities

GENERAL ELECTRIC

New York, Saturday, August 11, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

Henry W. Blake and Harry L. Brown, *Editors*

Volume 62
Number 6

Utility and City Prosperity Go Hand-in-Hand

A NEW YORK CITY official recently justified the operating loss on the municipal trackless trolleys in Staten Island by the plea that the city will get back in increased taxes because of higher land values many times the loss in operating costs. Very likely this is true. This increase in value of real estate is a recognized byproduct of the operation of every public utility. Without their supply of transportation, electric light, water or gas, land otherwise suitable for building purposes is of much less value. Every city gains as the service of its utilities improves in quality and in the extent of the territory supplied.

But if this is so, why do so many municipalities act as if any prosperity of its local utilities is gained only at the expense of the citizens? Why, in New York for instance, does additional transit in Staten Island deserve a subsidy, while in the other four boroughs transportation has had to be decreased because the city failed to co-operate in helping to promote good transportation? The neglect of the city in providing the repair facilities for the rapid transit cars called for under the contract between the I. R. T. and the city is a case in point.

These are questions which the New York City administration can well answer. And there are other cities where the lesson of this close connection between city and utility prosperity is still to be learned.

Salaries Again—What Poor Salaries May Mean

EXAMPLES of underpay of men of the electric railway field, particularly the master mechanics, of which the JOURNAL has spoken frequently of late, keep coming to the attention of the paper. Perhaps all of them ought to be cited to impress the fallacy of one of the things that is holding the industry back. One instance, which shows more definitely than common what this policy means, follows:

Three years ago the master mechanic on a small city property operating some forty cars came to the manager and said he simply must have more money. He was making $2,500, had a family, and the high prices of necessities were pressing him hard. He was a competent man and was keeping the cars up to a high standard of repair. But the manager would not consent even to the $500 increase that would satisfy the man.

He quit—as he should have done. Subsequently this same manager replaced him with an inferior man whom he paid $3,600. The condition of the cars has steadily gone down, until today, a new manager who is about to make a change in this department, estimates that at the very least it has cost this company $200,000 in excessive maintenance expense, not to mention the losses of patronage from irregularities and failures of service, because that former master mechanic was let go.

Such decisions about the salaries of those men in responsible positions who have demonstrated their ability and in whom the company has the invaluable asset of experience on the property are evidence that no real thought is given the matter.

The JOURNAL is going to have more to say about this subject, because it believes that it points to the remedy for one ailment of the industry which goes right to the root of things. It is impossible to get 100 per cent heart and head interest in the work when the man carrying the responsibility is sadly underpaid, and knows it, and is spending half his time trying to find a way to jump to another field.

N. & W. Electrification Has Contributed Notably to Knowledge in this Field

ALTHOUGH it was not one of the earliest steam railroad electrifications, that on the Norfolk & Western Railway was a pioneer in several important respects. It was the first to demonstrate on a large scale the real abilitiy of electric operation to increase track capacity in the movement of heavy freight trains up long, steep grades. It was the first to prove that constant-speed motors can be supplied from a single-phase distribution circuit under the difficult conditions imposed by everyday service on an important freight-carrying railroad.

At the present day it requires a stretch of the imagination to picture the phase converter as it was ten years ago. The underlying principles upon which its operation depends were, of course, well known. But as a piece of laboratory apparatus it was merely of interest, and that is about all. There had not previously been any considerable commercial demand for a machine to convert single-phase into polyphase power. Ten years ago the demand materialized all at once and on a large scale. The result was highly creditable to the scientific knowledge and designing skill of the time, for the phase converter has proved to be one of the most reliable and effective parts of the N. & W. locomotives. The only important change in design, which will be incorporated in the locomotives now building, is in the use of the synchronous, in place of the induction principle in the phase converting apparatus. This is not a fundamental change, and it is simply for the purpose of improving the power factor. The slight extra complication in the excitation is believed to be offset by the better effect on the power circuit.

Being a pioneer, the N. & W. found it necessary to solve a number of problems. The solutions are now available to other roads contemplating electrification. They will, for example, save the Virginian Railway much expense and difficulty. Locomotives for service such as that involved in hauling 3,000-ton trains up 2 per cent grades at 14 m.p.h. will hereafter be built more ruggedly than the first N. & W. machines because the test of time has shown where the weak points were. This is perhaps the greatest contribution to the development of the art of heavy electric railroading that the N. & W. has made.

A visitor to the N. & W. electrified zone is impressed by the matter-of-fact way in which the electric engines perform their work, and by their general inconspicuousness. All evidences of experiment are gone. The electrification as a whole functions like a well-oiled machine. Like so many of the electrification projects, heralded as great achievements and arousing greatest interest at their instigation, it plays its part in trunk line operation so well that its existence is almost forgotten by the general public and even by steam road men. In fact, the mileage electrified has been nearly doubled since the original installation, almost without any general cognizance of the extension. The article in this issue brings the N. & W. project back to mind and relates an intimate account of the results that are being obtained, as found by one of the JOURNAL editors after spending a week in the electrified zone.

The "Journal" Placed on the "Index Librorum Prohibitorum"

LAST week this paper printed an editorial to which the president of the company directly concerned took exception by telephone. Later by a written communication he discontinued all that company's subscriptions to the JOURNAL. He was invited to make use of the JOURNAL pages to express his views, if he thought the editorial unfair in any respect, but has not responded.

Since the JOURNAL is thus placed on the "Index Librorum Prohibitorum" for the men of this company, because of what was printed, perhaps the reason for the editorial should be stated.

The burden of last week's editorial was that the company in question had embarked on what appeared to be a dangerous experiment from the standpoint of the industry. In so expressing its own view, the JOURNAL, which aims to reflect also the best opinion of the industry it champions, naturally puts the interests of that industry as it sees them above the acts or interests of any individual company, where these seem to be running counter. It was thought that the shutdown of this property was a matter of great concern to the industry, for the reasons, among others, set forth in the previous editorial, and the developments up to Thursday night of this week have not changed this opinion.

A Reflex Benefit of the Merchandising Transportation Movement

SALESMANSHIP, in order to be most effective, must have to do with commodities or services which are first class in quality and well adapted to the needs of the prospective purchaser. This principle applies in selling electric railway car rides, as well as typewriters, automobiles or dry goods. No self-respecting salesman can afford to exert his efforts in selling things with which his customers will be dissatisfied. To do good work he must first convince himself or be convinced that the community in which he sells will be benefited by purchasing his wares.

Of late years the electric railways have been directing increased energy in salesmanship to meet private automobile and bus competition. They did not do much along this line until the competition became threatening. Coincident with the developing of merchandising plans, the qualities of the product of the competitors had to be studied, in order that all aspects of the competition might be met, as far as possible. This in turn caused a study of the qualities of the transportation service which the railways were already rendering, with a view to seeing if it could be improved and hence more readily sold. This reflex action has been highly beneficial; in fact, to it may be attributed some of the principal improvements which have come about recently in electric railway service, especially those affecting speed, and those affecting passenger comfort, convenience and safety.

The above qualities are usually summarized as "good service"; good service being service that the public wants and will consider good if furnished, rather than what the manager finds it most convenient and profitable to give. The present concentration of effort in merchandising transportation has tended to standardize the quality of good service. Once a railway is sure that, measured by modern requirements, it is giving good service, it may properly and profitably talk more about it.

Temporary Traffic Stimulators Are Not Good Business

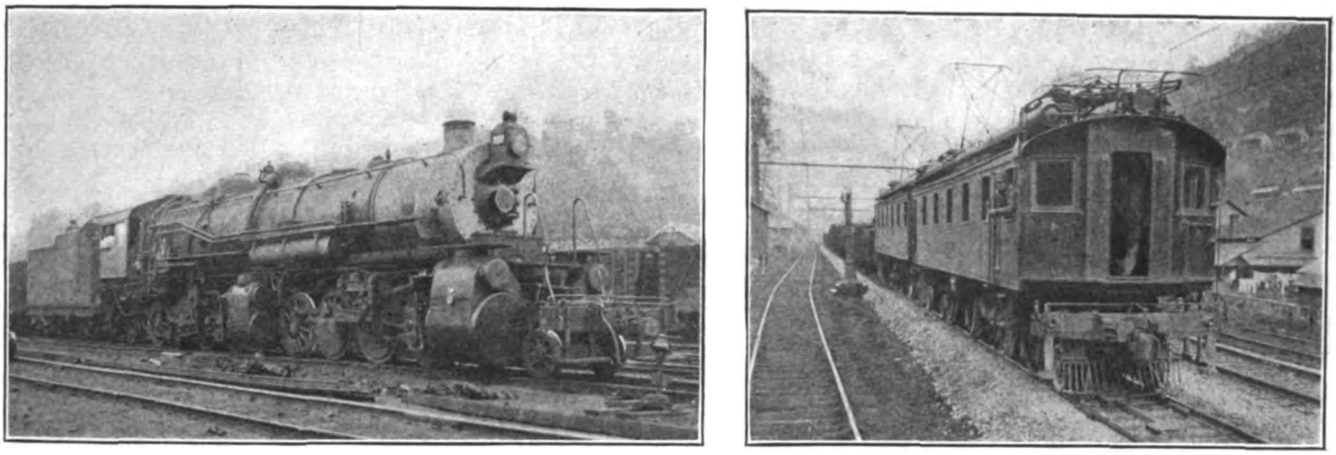
THE article in the July 14 issue on "Selling Transportation in 1890" should be a reminder to the present-day operator that blanket transportation is not so new as some people imagine, and that no one need be afraid of it. Indeed, while the season ticket was but a sporadic phenomenon in this country it has been a matter of course abroad almost from the first days of railroading.

The experience of Mr. Owen's company in the far-away days of 1877 is not without a lesson for us now. His company covered a great deal of ground in going from 7 cents to 5 cents with six tickets for 25 cents in single-trip fares and in putting on passes that ran from one month to a lifetime. Apparently, he started off with a proper analysis, but the successive changes in rates, and especially in allowing unlimited riding for $1 a month, indicate that the company did not understand or follow the economic principle involved in the weekly pass. This principle is that the purchaser of a pass must pay a price equivalent to at least two standard or ticket fares a day, so that his reduction in rate is obtained only through the addition of non-rush rides that generally are available without an increase in the amount of service.

Probably the writer of the paper has gone to a realm where each inhabitant is supplied free of charge with self-contained, high-speed transportation, so he would consider futile any argument on his conclusion that traffic stimulators should be regarded only as temporary expedients. This is true enough of special excursion rates, and the like, but it is not true of plans like short-haul fares, off-peak rates, the monthly card and the weekly pass. There is ample experience to show that if such stimulators are removed, riding and revenue fall down to the old levels with striking swiftness. Therefore, the motto should be, in the words of Davy Crockett, "Be sure you're right, then go ahead," and make your patrons feel that you will stay put so long as no radical changes occur in costs.

A Decade of the N. & W. Electrification

Operating Experience Has Led to Minor Changes in Original Designs—Electrified Mileage Has Been Doubled Since the First Project Was Completed—Some of the Methods of the Transportation and Other Operating Departments Are Described



Three of These Mallets Could Not Do What Two Electrics Do on the N. & W.

MANY changes have taken place since the Norfolk & Western Railway made its decision ten years ago to electrify the section over the divide in the Blue Ridge Mountains between Virginia and the southern part of West Virginia, about 360 miles from the Atlantic Ocean. Originally the plan was to electrify the line from Bluefield to Eckman Yards, but before the work actually was done an extension a few miles farther to Kimball was authorized. The route distance from Bluefield to Kimball is 27½ miles, or 1½ miles longer by way of a detour between Cooper and Bluestone Junction.

The total single-track mileage involved in the first electric installation was approximately 108, the road being double-tracked except for a section of slightly more than 3,000 ft. through the Coaldale tunnel, and for the detour between Bluestone Junction and Cooper. There also are numerous yards and sidings in the electrification.

SUCCESS OF ELECTRIC OPERATION ATTESTED BY CONSISTENT EXTENSION PROGRAM

Hardly was the original installation completed when the process of expansion began, and it is now proceeding rapidly. In 1915 and 1916 the 5 miles of route between Bluestone Junction and Clift Yard were electrified, as well as a mile between Bluestone Junction and Pocahontas.

Just prior to the war an extension of the electrification westward from Kimball was started, including the main line to Farm and a single-track branch from Welch to Wilcoe Yard. Unfortunately this project, which comprised 51 miles of single track, was interrupted by the war, but since the armistice the work has been pushed to completion.

Even before the Wilcoe-Farm extension was finished, the directors of the company voted to continue the electrical installation westward to Iaeger. The Farm-Iaeger project, now being constructed under the direction of Gibbs & Hill, New York, involves a route mileage of 22, and a total of 50 equivalent single-track miles. With the extension just completed the mileage of the original installation will be nearly doubled.

FEATURES OF THE OVERHEAD CONSTRUCTION

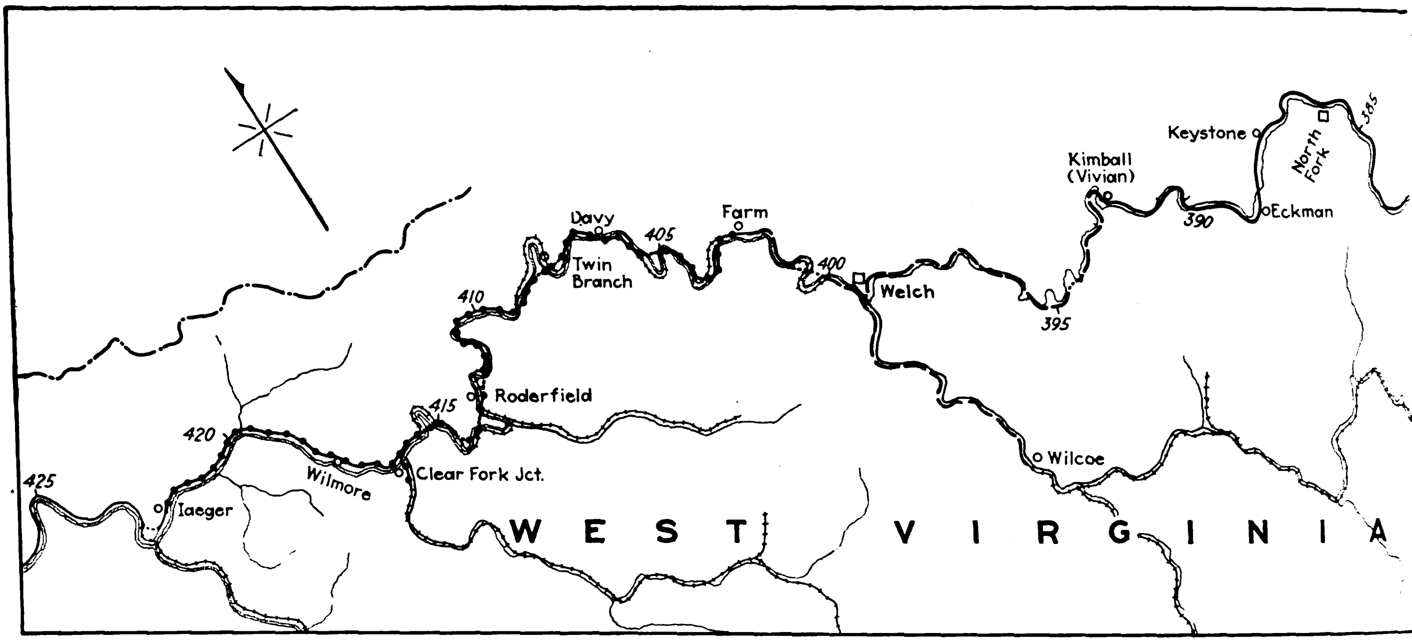
In general the overhead construction in the new work will follow the lines adopted earlier, but a few changes have been made in details. Instead of tubular poles, columns of H-section will be used. These will be of four sizes, 12 in. x 12 in., 10 in. x 10 in., 8 in. x 8 in., or 6 x 6 in., as conditions may require. The columns will be supported on steel base plates bolted to concrete foundations.

The cross-members will be of H-section as in the original installation. On the Wilcoe-Farm extension the cross-members were made up of two angles riveted together to form a T, with spacers between the vertical sides. This was done because it was impracticable to obtain H-section steel during the war, although the latter is preferable as it is more substantial and is easier to keep painted.

The guys will be of strand in place of the rods used earlier. Each will terminate at the ground end in a threaded rod to which it will be connected by a turnbuckle. The sockets to which the strand will be attached directly will have extra large baskets. Tests have shown that the strand will break before it will pull out of a socket.

The guy anchor or "dead man" to which the threaded rod will be attached will be of concrete, and a sleeve of iron pipe will be slipped over the lower part of the strand to protect it and the rod. It is planned to pre-cast the guy anchors at a central point and haul them to the job, whereas in the earlier work they were cast in the field.

Suspension insulators will be used for supporting the messenger wire wherever possible, even in the tunnels. In the tunnels, however, it will be necessary to employ pin-type insulators on the insides of the curves. The hangers will be made extra long to allow of shortening



The Several Steps in the N. & W. Electrification from Bluefield to Iaeger Are

to maintain vertical clearance, as mentioned elsewhere in this article.

Practically all the fittings used in the tunnels will be of bronze to prevent corrosion. This will extend to the messenger, which will be of extra high strength bronze.

SOME CHANGES IN OVERHEAD FOUND DESIRABLE

It was expected at the start that changes would have to be made in the construction, as the Norfolk & Western was a pioneer electrification. For example, soon after operation was commenced it was found that the No. 00 hard-drawn copper auxiliary messenger wire which supports the contact line, and the contact wire itself, which was of No. 000 bronze, were overheated on the heavy grades. To remedy this a second auxiliary messenger, similar to the first, was added at certain points.

An interesting modification in the overhead construction has been made necessary by the steady rise in the track elevation, which has averaged about 1 in. per year. This rise is caused by the inclusion with the ballast of a large amount of coal dust dropped from the cars. It has been found difficult and expensive to separate this by forking or other ordinary maintenance method, the more economical way being to reballast the track to a slightly higher level. The result after ten years is that provision has had to be made for raising the contact wire from time to time in order to preserve the necessary clearance.

While in the most recent construction this condition will be provided for by shortening the hangers from time to time, this is generally impossible in the earlier sections of the electrification. In a recent case the procedure was adopted of lengthening the poles. This was effected by first cutting off the tubular poles at the ground line with an acetylene torch, which was necessary because the poles were firmly grouted in holes molded in the foundations, so that they could not be removed without breaking up the concrete with possible damage to the poles. After the cutting off of a pole it was reset in a casting consisting of a baseplate with a cylindrical sleeve, with an inside diameter considerably larger than the pole. A cement grout was tamped between the pole and the sleeve. The baseplate was attached to the concrete foundation with two anchor bolts, which were made long enough to permit the baseplate to be raised 8 in. or more on shims. The extended ends of the anchor bolts were covered with caps of pipe held down by extra nuts.

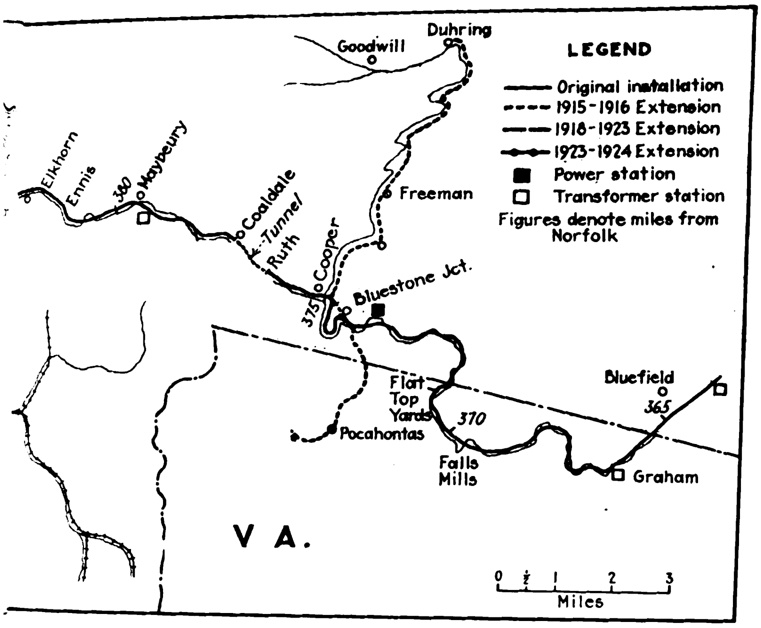
One of the largest reconstruction jobs which has fallen to the electric traction department, and which is now being completed, was due to the relocation of the main line on Ruth Hill between Bluestone Junction and the east portal of the Coaldale tunnel. The original installation at this point was single track, and since it was planned for a double tracking later the extra contact system easily could have been installed. It was decided, however, to relocate a portion of the track at the time the second track was installed, so as to improve the alignment, reducing the maximum curvature from 10 deg. to about 5 deg. This involved the relocation of the catenary structure for a distance of more than 2 miles. New foundations had to be installed, involving cutting off the poles and replacing them in base castings of the type used for raising the overhead. In some cases the cross-structure had to be lengthened. Signal locations had to be changed, and in some places new structural anchor bridges had to be erected.

LINE MAINTENANCE METHODS

Line maintenance work is done by two groups of linemen, one having headquarters at North Fork, the other at Bluestone Junction. Their principal duties are to repair damage, paint the structures and test insulators. The chief sources of trouble are wrecked pantographs and insulator flashovers. A general line foreman has supervision over all line maintenance, with a foreman in charge of each repair gang. One man has the duty of patrolling the line constantly, for which purpose he rides the trains.

In line maintenance work a gasoline motor car is used, which has sufficient power to pull a trailer carrying materials. Line repair work can be handled from this car also; in fact, it takes care of most of the work, so that the work train is not called out more than once a year.

Work is done on a "hot" line only in the spans. For this purpose ladders impregnated with paraffin are


Duhring
Goodwill
LEGEND
Original installation
1915-1916 Extension
1918-1923 Extension
1923-1924 Extension
Power station
Transformer station
Figures denote miles from Norfolk
Elkhorn
Ennis
380
Maybeury
Coaldale
Tunnel
Ruth
Freeman
Cooper
375
Bluestone Jct.
Flat Top Yards
370
Pocahontas
Falls Mills
Bluefield
365
Graham
VA.
0 ½ 1 2 3
Miles

Indicated on This Map

employed, being in 12-ft. sections. If it is necessary to do work at the insulators the power is shut off. Few accidents happen in line work.

There is little wear on the contact wire, as it is of bronze alloy, and the pantographs are well greased.

Each insulator is tested with a "megger" every year or two. At present not more than 2 per cent of the insulators require to be replaced each year.

Wood strain insulators are used for pull-offs and between tracks. Formerly they gave some trouble from flashovers, but this has been stopped by reinsulation. The original varnish which came on the insulator is scraped off, after which the insulator is heated in a baking oven to dry it out. It then is painted with a dipping varnish and baked. It is revarnished and baked again, after which it is ready for service. About once a year thereafter it is given a coat of air-drying varnish.

There are now six step-down transformer stations for supplying the single-phase trolley. These are located at Bluestone Junction, Graham, Maybuery, North Fork, Kimball and Welch. Each of these is near a passenger station. The station agent gives general supervision to the operation, which is very simple. If a circuit breaker goes out, it rings an alarm bell in the near-by station. The agent steps over to the transformer house, looks at the switchboard to see what has happened, and telephones the power director, who gives him instructions.

All the transformer stations are under the general care of one electrician, with a helper. They visit the substations regularly every day or two.

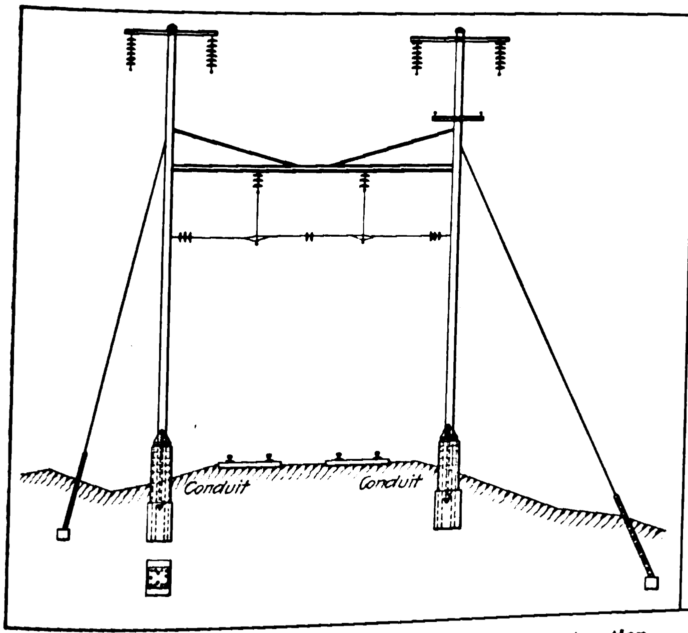
A possible cause of trouble that must be watched carefully is the failure of the supply of cooling water for the transformers. To protect against possible difficulty a simple device is used to warn the station agent by ringing an alarm bell in case of a failure of the supply. A light brass contact lever is pivoted near its middle on a bracket attached to one side of an enlargement of the vertical supply pipe. One arm of the lever passes through a window in the enlarged pipe and reaches into the path of the water current. The other end completes an electric circuit unless it is held out of contact by the force of the water impinging on the opposite end, the arm being pivoted off the center so that it is slightly out of balance.

The transmission line for the extension has been designed for an ultimate voltage of 88,000, although for the present 44,000 volts will be retained. Later it will be stepped up from 44,000 to 88,000 volts at Welch, 20 miles west of the power house.

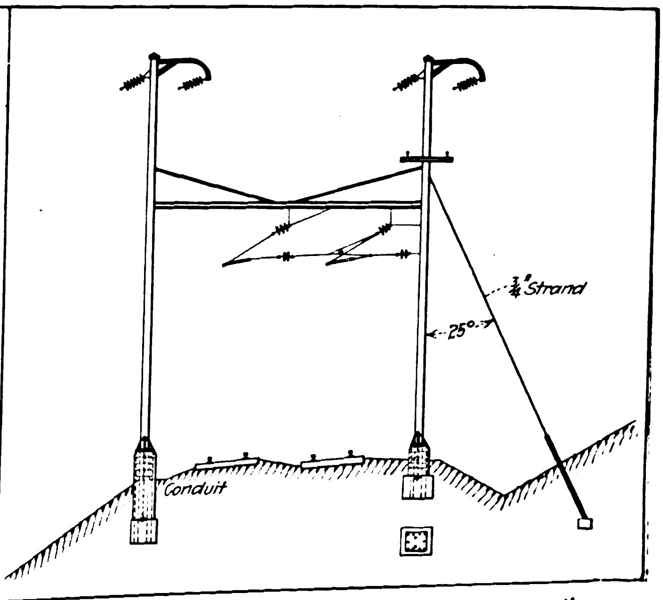
The new line will be insulated with four-section suspension insulators. Several tunnels are included in the route, and the transmission line will be carried over the mountains at the tunnels on a double pole line comprising H-columns set in concrete.

EXTENSION WILL LOAD THE POWER PLANT FULLY

Operation of the extension to Iaeger will place a full load on the power plant at Bluestone Junction, where the limiting feature is the supply of condensing water. It also will load to capacity the transmission lines to Welch, which were designed originally with a view to the present extension. The boiler equipment, however,


Conduit
Conduit

Essentials of the Farm-Iaeger Section Overhead Construction on Tangent Track Allows for Raising the Contact Line


¼" Strand
25°
Conduit

On the Curves, Which Are Numerous, Special Construction of the Overhead Is Necessary

had to be increased by the addition of two boilers which were provided for when the original twelve boilers were installed. These will be of the Stirling type, similar to those already in operation, with about 6,800 sq.ft. of heating surface each. The total installation will then be fourteen boilers, with a rating of something more than 8,000 boiler horsepower.

A question naturally arising in connection with the power plant capacity is the extent to which the electric locomotives return power during regeneration. Experience has shown that while considerable power is regenerated by trains descending the grades, it is all consumed on the line by other trains, so that while the power plant is relieved of load to that extent, power seldom is returned to the station to be absorbed in the water rheostat provided to guard against such an emergency.

Locomotive Frames Have Been Strengthened

The locomotive underframes originally were not designed for the tremendous stresses imposed on them in the starting of the heavy tonnage trains that are now hauled, in order to secure maximum capacity from the track. The twelve original locomotives not only handled all of the road work, but did the switching as well. The largest overhauling job which has been done has been to rebuild the locomotives with heavier side frames. This was accomplished without interfering with service, although it was carried out during a period of very heavy traffic demands. Today the locomotives are in practically perfect condition.

The lessons learned from experience with the first locomotives have been incorporated in the designs of the four ordered recently. These double-unit engines are now under construction by the Westinghouse and American Locomotive Companies. They will be one-third larger in capacity than the present machines. Their principal duty will probably be in pusher service on the long grade, which has its summit at the Coaldale Tunnel. These machines are due for delivery about Jan. 1, 1924, by which time the extension of the electrified section will be completed. These locomotives were discussed in this paper for Dec. 30, 1922, page 1012.

At present the full load on the 2 per cent grade eastbound, for a train with a leading engine and a pusher is 3,250 tons, while on the lighter grades 1,500 tons more can be hauled. One locomotive holds 3,250 tons easily on the 2½ per cent downgrade eastward from the tunnel by means of regeneration. Two of the new machines will take a train of more than 4,000 tons up the 2 per cent grade, and one will hold the same train by regeneration in the descent of the 2½ per cent grade.

Electric Operation Has Cut Down Congestion

From the standpoint of the men operating the electric zone, the outstanding feature of the electrification has been the reduction of congestion, particularly at the Coaldale tunnel. In the days of the steam engine trains would pile up on each side of the tunnel waiting to get through; now there is never any congestion. Formerly, on the long, steep grade leading eastward up to the tunnel, it was not possible for three Mallet engines to make more than 7 m.p.h. with a full tonnage train of 3,250 tons, whereas the electrics easily make 14 m.p.h. with one leading and one pushing locomotive.

Formerly "turning engines" was a time-consuming process, as it required from ten to twelve hours to recondition a Mallet for service after a run of from ten to twelve hours on the road. Not only was there much to be done in the way of cleaning fires, etc., but engines had to wait their turn for attention. With the electric engines, twenty-four hours or more of continuous service can be secured, while they can be "turned" in forty-five minutes.

Naturally, with these conditions, together with the general improvement in the electric zone due to the small number of clean, easily-controlled and reliable electric engines, the operating men are enthusiastic about electrification as they see it.

The electric crews form an independent section in the operating department, there being at present sixteen to eighteen crews to "protect" the eight or nine locomotives required to handle the traffic at this season. This year the movement of coal is largely westbound, due to the higher prices obtainable in the West. More men are needed when freight movement eastbound (up the grade) is the heavier.

The electric runs are selected by the crews in order of seniority. These runs are preferred to all steam runs except those in passenger service. The latter are in demand on account of the regularity of hours and general working conditions, so that men can depend on being at home at definite times. All freight trains, except time freights, are made up as business warrants, and electric crews are called out in rotation on eight hours notice.

When a run becomes vacant it is posted for five days, and the applicants ranking highest in seniority are assigned to it. The runs of the successful applicants are then posted for five days, and so on.

Men Qualified for Steam or Electric Operation

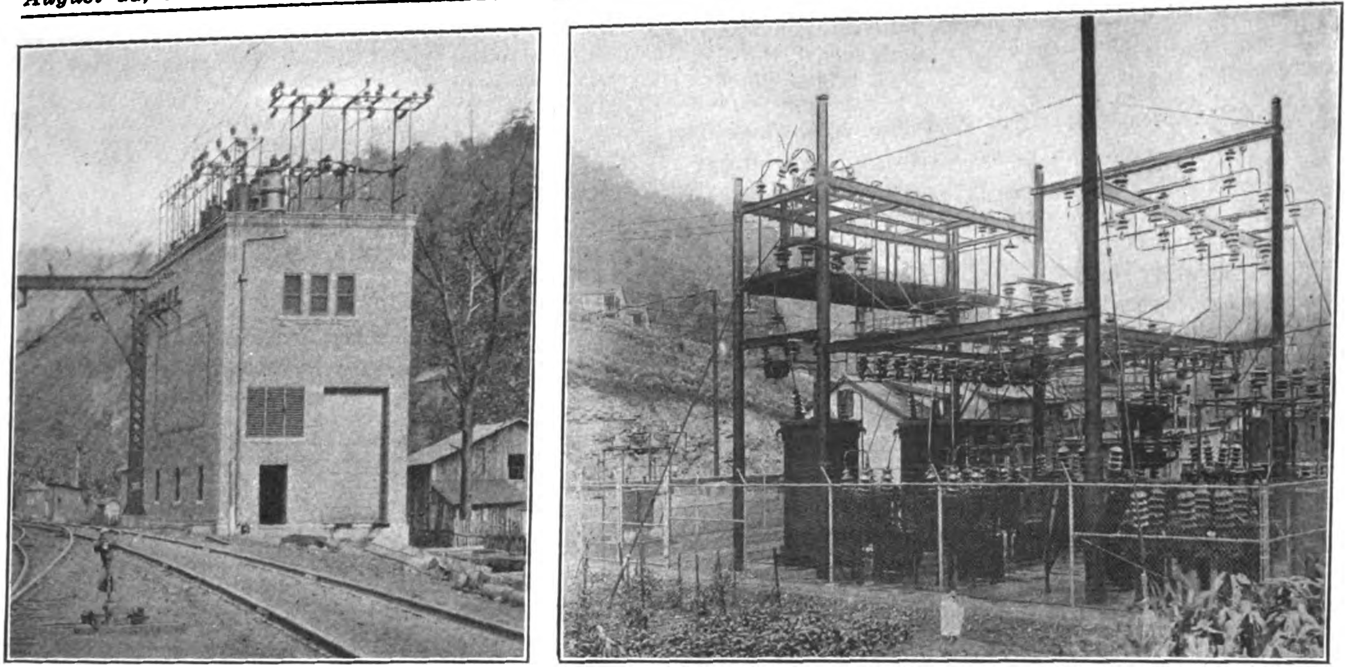
The men placed in charge of electric engines are qualified both for steam and electric operation. A supply of experienced men is assured, since the electric runs are in demand and those who apply for them are high on the seniority list. The steam men soon qualify for the electric runs, about a week being required for an engineer and less for a helper.

Instruction in electric engine operation is given by an assistant road foreman of engines, who is an electrically trained man familiar with every detail of the equipment. He first explains in the shop the different parts of the equipment and their functions and especially stresses the procedure in case of accident. He then goes into the handling of trains in regular service and gives practice in starting up an engine and shutting it down.

An examination is given at the office, such questions as the following being asked:

> In case of wrecked pantographs, how do you protect yourself?
>
> What holds a pantograph up and pulls it down?
>
> How much of the circuit has 11,000 volts on it—that is, the main engine circuit, and what apparatus?
>
> How many different circuits are there on this engine (high tension, low tension and control)?
>
> What are the five duties of the phase converter?
>
> What is the use of the rheostat?
>
> How do you start up a "dead" engine—that is, one with no air?

After the men have satisfactorily passed the examination they are certified for electric operation. In the assignment of runs new engine men are paired with experienced helpers, so that they will not be bothered with details which the helper should be able to handle.



The Earlier Substations Were Largely Inclosed, the New Ones Are of the Outdoor Type

Once each week (Monday morning at present) the instructor holds a meeting of all who desire to attend, at which he reviews the subject of electric operation, answers questions, etc. Steam engine helpers attend this class at their option, if they desire to prepare for electric runs without interference with their regular work. They thus facilitate the taking on of electric runs when they become eligible for them.

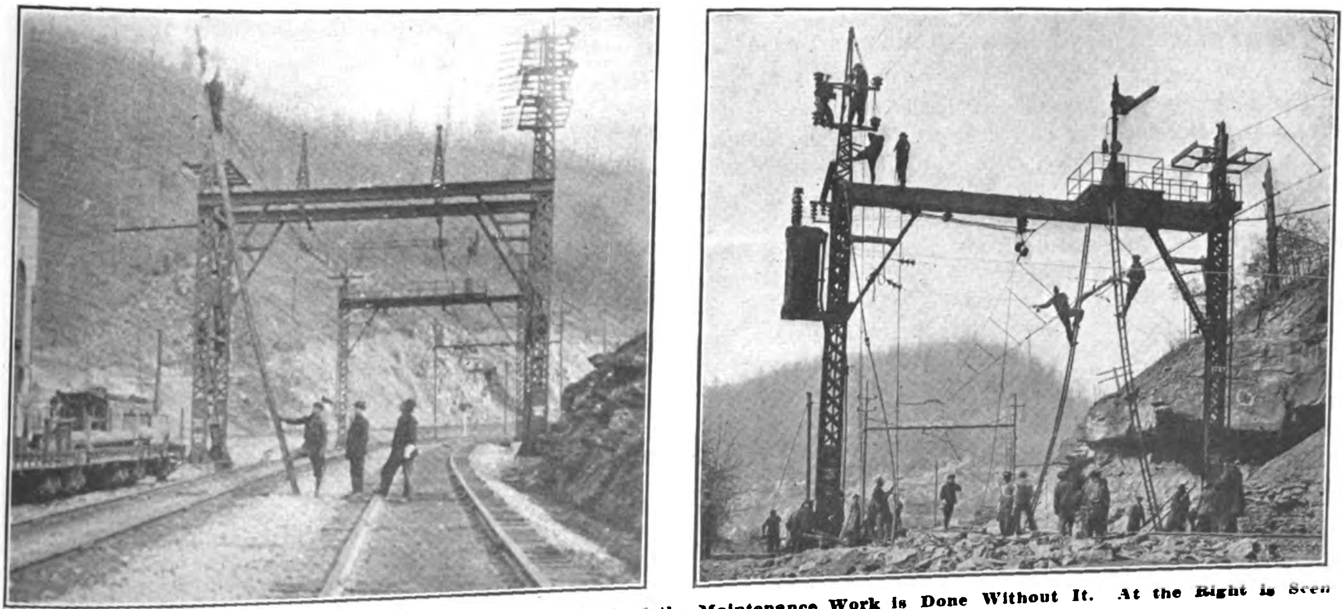
In connection with the initiation of new men in the electric service, carefully worked out sets of instructions are used. The following partial quotation shows the general character of these:

> Handling single trains with constant-speed electric engine.
>
> *Speed changes.* Accelerate first to 14 m.p.h.—change over to 28 m.p.h. by changing two trucks at a time in order to keep slack stretched.
>
> *Change from motoring to regenerating.* Selecting a time when the train is balanced over the summit in order to maintain constant speed while the change is being made and prevent rough slack action, shut off, throw the balancing lever from motoring to renegerating postion, etc.

An important operating rule, to which special attention is given in the instruction, relates to what is to be done if power fails. Under these conditions the rule provides that the train is to be stopped and hand brakes set. This is done so that there may be no possibility of damage due to air failure.

POWER DEMAND AN IMPORTANT CONSIDERATION

Another important thing taught to the new electric operators is the importance of keeping the power plant informed of unexpectedly large demand for power. In order properly to co-ordinate the operation of trains and the supply of power, close communication is maintained between the train crews and the power house switchboard operator. The latter has before him a train sheet made up from reports furnished by telegraph operators along the line. He thus knows at least approximately the probable demand for power. He also has telephone communication with each eastbound signal, so that in case a train is liable to make



The Work Train Is Called Into Action Occasionally but Most of the Maintenance Work Is Done Without It. At the Right Is Seen the Operation of Moving a Signal Bridge on the Ruth Hill Job an unexpected demand for power, the train conductor, engineer or fireman can call in and report the circumstances.

N. & W. ELECTRIFICATION WAS CARRIED OUT AT A FORTUNATE TIME

In conclusion, a few words regarding the general features of the N. & W. electrification may be of interest.

The electrified zone is part of the Pocahontas division, which covers the Bluefield-Williamson district in Virginia and West Virginia, as well as the Bluefield-Norton through the Clinch Valley in Virginia. The principal function of the electrified section is to gather the loaded coal cars from the sidings and yards along the line, where it is delivered from the mines in the famous Pocahontas coal region, haul them up the long 2 per cent grade and through the Coaldale tunnel, ultimately delivering them at the classification yard in Bluefield. Electric engines also assist in the movement of time freight and passenger trains through the electrified section, but their principal duties are the handling of loaded and empty coal trains.

Certain passenger trains eastbound receive assistance from electric pushers through the electric zone, but they need none when westbound. An incidental advantage of electric operation is that these passenger trains save twenty minutes over their former schedule time for the 11 miles between North Fork and Bluestone Junction. At first it was possible to make up lost time at this point, but the saving is now incorporated in the time-table, which allows thirty-seven minutes for covering this distance. Two steam locomotives and one electric are attached to the train, which makes a free running speed of 28 m.p.h.

The original installation was fully described in the issue of this paper for June 5, 1915, page 45, and in numerous shorter articles. It comprised a 27,000-kw. power station at Bluestone Junction, twelve "split-phase" (single-phase three-phase) electric locomotives, with a rated capacity of 3,000 hp. each on a one-hour rating, and five transformer stations in which the voltage is stepped down from 44,000 to 11,000 for use on the contact wire. Shortly after operation started an additional 9,000-kw. generating unit was installed in the power station.

THE RESULTS HAVE FULLY MEASURED UP TO EXPECTATIONS

The primary purpose of the electrification was increase in track capacity and the result was satisfactory from the start. A dozen electric locomotives replaced thirty-four or more of the then most perfect Mallets. It was found to be possible to handle twenty coal trains eastbound daily, as well as assist six time freight and passenger trains up the grade, the total eastbound tonnage being 65,000 daily. In 1917 the electrical engineer of the railway stated that during the preceding year nine electric locomotives had handled a fifth more freight than forty-three steam engines had done in 1914, the normal number in service being respectively seven and twenty-four. The cost per million tractive-miles was reported to be 12½ per cent less with electricity than with steam.

Fortunately the electrification was in full operation before the breaking out of the war, and it was an important factor in delivering large quantities of coal for use on naval and merchant ships.

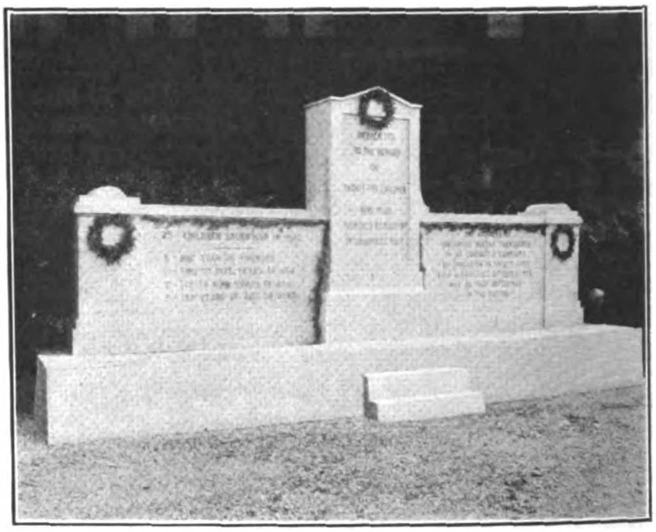
Safety Week in Louisville

The Safety Council Conducted a Successful Campaign—All the Local Industries Were Enlisted and Contributed Freely of Time and Money

BY NEIL W. FUNK
Safety Director, Louisville Railway Company

FOR the past two and a half years our company has had in Louisville a safety council in its own organization that we believe has done and is doing some most useful work in the prevention of suffering, loss of life, and loss of much needed money. Regardless of how well we train our men, and regardless of how careful they are, there are still at least 60 per cent of the accidents that we cannot prevent unless the citizenship in the community is also trained to safety. We therefore welcomed "Safety Week" in Louisville as a fine opportunity to "sell" our citizens the ideals toward which we had been striving so hard and with considerable, yet not complete, success.

The Louisville Safety Council, of which Lee Miles, president of the Louisville Cab & Transfer Company is president, decided on a safety week for our city beginning June 3 and concluding June 9, 1923. George H. McClain, managing chairman, was able to interest practically all of our industries, including our railroad companies, in the movement.



Monument Erected by Employees of Louisville & Nashville Railroad and Dedicated by Twenty-five School Children

The program opened on Sunday, and the ministers agreed to preach from their pulpits on the subject of safety. We therefore truthfully can say that safety week was opened with prayer.

On Monday there was dedicated a monument constructed by employees of the Louisville & Nashville Railroad to the twenty-five little children between the ages of one and fifteen who had been killed by automobiles in Louisville during 1922.

During the week the safety council maintained a bureau to furnish speakers to all industrial plants that requested safety talks. More than 100 large industrial plants had noon-day meetings, and the most prominent speakers of our city considered it a privilege to make safety talks to workmen. In this way the council was able to arouse much public sentiment for the safety movement. The speakers had been instructed to dwell especially on educating the child in safety ideals, and

I was a Jay Walker
He was a Speeder
PUBLIC SENTIMENT WILL STOP BOTH
Louisville Cab & Transfer Co.

The Prize-Winning Float in the Safety Parade

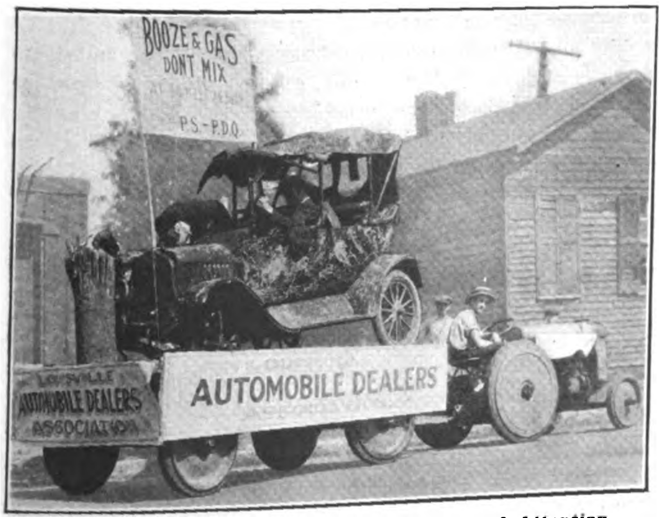
plant problems as to accident prevention also were emphasized.

On Friday of safety week perhaps the most beautiful parade that ever passed through the streets of Louisville was organized and held. L. J. Hannah, manager of the Dodge automobile agency, was chairman of the committee in charge. This parade was 2 miles long and consumed about an hour to pass. Numerous floats that represented the various industries of the city testified eloquently as to what the business men thought about the safety movement. Some of the features of the parade were novel. For instance, in the past year ninety-five people had been killed in accidents. This was gravely represented by having ninety-five boys dressed as skeletons to march with measured tread, leading the parade.

A prize offered for the civic organization presenting the finest representation in the parade was won by the Kiwanis Club, which had four impressive floats in line. The prize offered for the business house that had the finest float was won by the Louisville Cab & Transfer Company. The float is shown in an accompanying illustration. There were altogether sixty-five such floats in line. The United States government sent a band from Camp Knox, a regular army training camp. In all, more than 2,000 people took part in this parade. We were convinced that on this day Louisville had been sold on safety and accident prevention work.

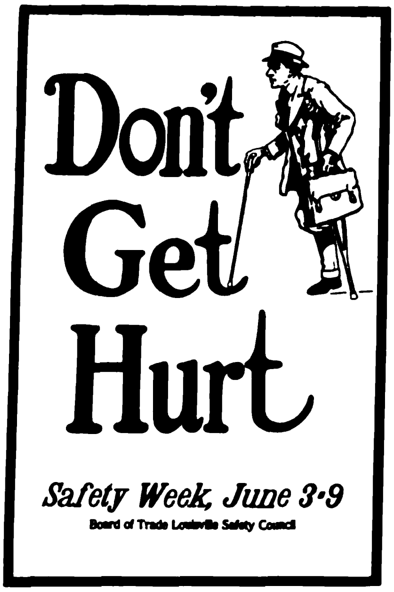
Safety week was concluded on Saturday night by a public mass meeting, at which the main speaker was Jeff D. Keen, a railroad conductor of some forty years service. The title of his speech was "The Value of Safety." Our own company's Inspectors' Quartet furnished the music for this meeting.

Just previous to safety week a general meeting of seventy-five business men was held in the offices of the Louisville Railway, where Mr. McClain explained what he wanted the industries of Louisville to do. It was also agreed at this meeting to use as a general slogan the phrase "Don't Get Hurt." During the week this phrase was broadcasted from every truck, street car, and vacant billboard in our city. It also was painted on the sidewalks. This company has twenty electrically-lighted signboards, 8 x 10 ft. in size, which we use constantly to display safety ideals. We put these signs at the safety council's service, and at their request we ran the slogan mentioned above. We also had this "Don't Get Hurt" sign placed in more than 400 street cars, and in the motorman's vestibules. We ran a large truck bearing the slogan through the streets the entire week.



The Wrecked Ford Attracted a Great Deal of Attention

The four local newspapers, the *Post*, the *Courier-Journal*, the *Times* and the *Herald*, all gave their hearty support, and all those connected with the actual work felt that they owed a debt of gratitude to them.


Don't Get Hurt
Safety Week, June 3-9
Board of Trade Louisville Safety Council

This Slogan Was Displayed in Various Forms All Over the City

Briefly, a word of our own company activities during safety week. We held twenty-two safety meetings, with an average of about fifty men to a meeting. We all felt that small group meetings on a property where a man actually works were more congenial than if we made him dress up and come down town to some hall. The meetings were attended splendidly and the speakers' remarks received attention.

These meetings were addressed by our director of safety and superintendent of transportation. We donated the services of these two men to the safety council during this week. They made sixteen speeches in large industrial plants and on steam railroad properties.

C. W. Price, vice-president of the Elliott Service Company, was with us the entire week. He was the director general of the whole affair. It will be a long time before Louisville forgets the personality and splendid energy of this man.

We think we obtained great results from safety week. There was not a single fatality and but one serious accident, while there were three accidental deaths and twelve serious injuries the preceding week. Since then we have had very few serious accidents in the city. As far as results in our own organization are concerned, we believe it accomplished much. The Sunday following safety week we ran from 300 to 500 cars for twenty-four hours through our streets without a single accident, something we had not done in recent years. We, in Louisville, have also discovered and believe that with co-operative activity and enthusiasm from our business men and industrial organizations, safety ideals can be sold to the citizenship of a community as easily as merchandise.

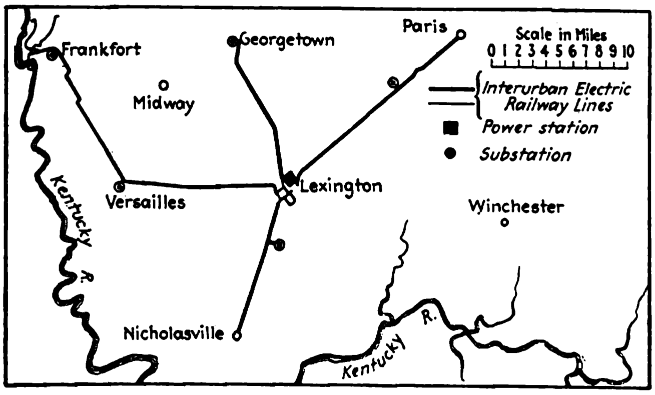
And Now, One-Man Freight Cars

Kentucky Traction & Terminal Company Applies Same Principles in Package Freight Service as Have Proved Successful in Passenger Business

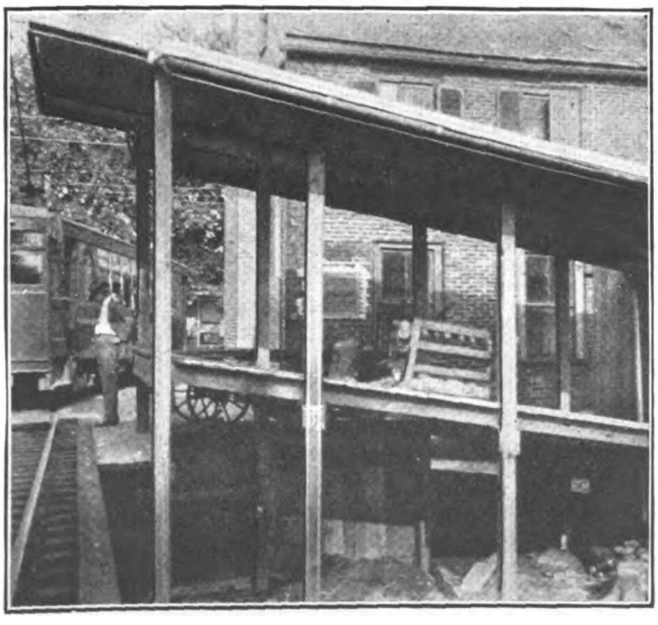
FOLLOWING the substitution, early last year, of light interurban passenger cars for others three times as heavy, the Kentucky Traction & Terminal Company has put two light freight cars in service, with one-man operation. These cars weigh 31,000 lb. each, are 40 ft. in length and are equipped with four 25-hp. motors, like the passenger cars. They were built by the Cincinnati Car Company. The management feels that their operation has been highly successful.

The general design of the cars is shown in the accompanying plan and elevation, together with the important dimensions. Each car is equipped for double-end operation, a compartment for the motorman being partitioned off at either end. An electric cab heater in each compartment is provided. The center end windows and the motorman's windows are equipped with drop sash, the wing sash being stationary.

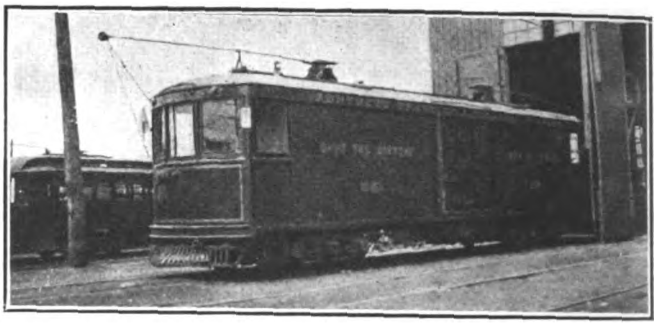
As shown in the accompanying map, four interurban lines radiate from Lexington to Frankfort (the state capital) and Versailles, Georgetown, Paris and Nicholasville. In each city there is a combined passenger and freight terminal. In each is an agent, paid by the month, who is normally on duty from 7 a.m. to 6 p.m., except at Lexington where he comes on at 6 a.m.



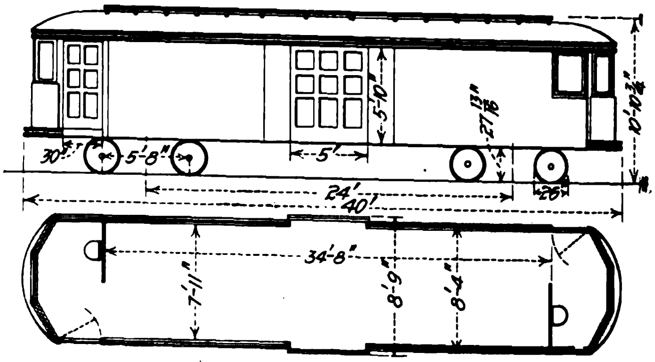
Map of the Kentucky Traction & Terminal Company's Lines



This Covered Inclined Freight Platform Is in the Rear of the Station at Georgetown



The New Package-Freight Car Weighs but 31,000 Lb.



Plan and Elevation of the Light-Weight Package-Freight Car

Accompanying illustrations show the rear of a building, on a prominent street in Georgetown, which is being remodeled for use as a passenger and freight station. Here the track swings off the street onto a trestle at one side of the property, where an inclined platform leads from the car floor level to the freight shed.

The schedule of operation for a day is this: Two cars leave Lexington early in the morning, respectively for Versailles and Frankfort (28 miles) and Paris (18 miles). After delivering their loads they take on freight for Lexington, and, returning, they load up at Lexington, one for Georgetown (12 miles), the other for Nicholasville (12 miles) and again return to Lexington. Each car thus makes either 60 or 80 miles in one day.

The freight cars are operated by one man unless way deliveries must be made, in which case another man is added. The company does not deliver freight locally, but in Frankfort has a delivery contract with a local truckman.

London Tramway and Bus Accident Showing Is Creditable

H. E. BLAIN, assistant managing director of the London Underground group, recently was the principal speaker at a meeting of the London Safety First Council, on which occasion he gave statistics regarding the street accident situation in London. He said that in the metropolitan area 104 more people were killed in 1922 than in 1921, the total number of killed being 684 and the number of injured 26,322. Of the total accidents 6 per cent were caused by motor omnibuses and 7 per cent by tramcars, the percentages being the same for 1922 as for 1921. As there was more than 6 per cent increase in passengers carried by omnibuses and nearly 3 per cent in those carried by the tramways, this showing was considered creditable.

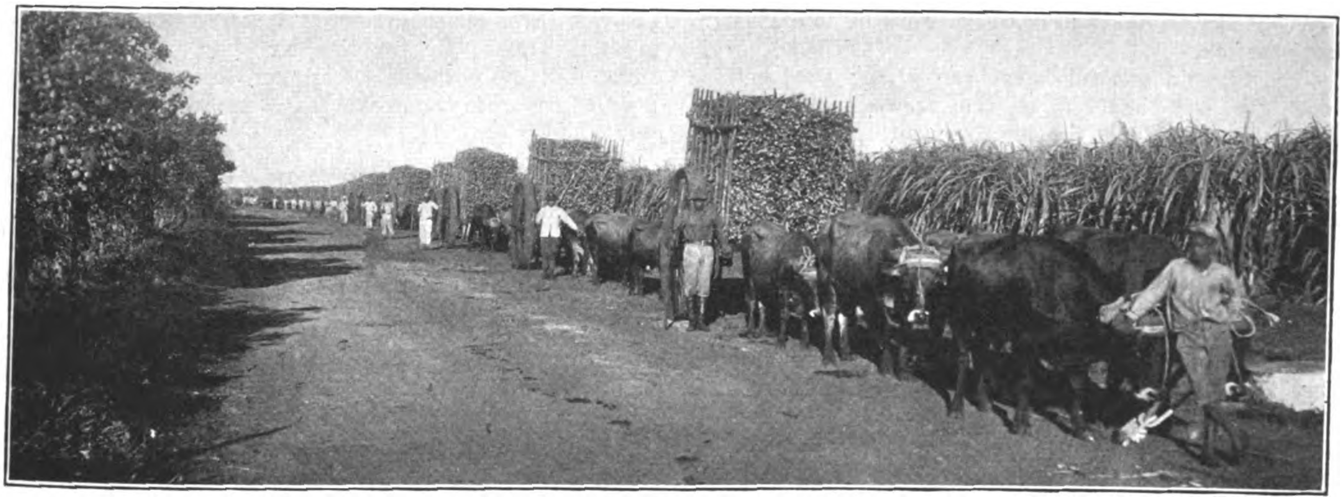
For 1922 trade motor vehicles caused 21 per cent of the total accidents, motor and pedal cycles caused 21 per cent and private motor cars caused 24 per cent, a total of 66 per cent, or two-thirds, for these causes.

Electric Railway Construction and Operation in Cuba—II

An Absorbing Account of the Means Followed in Adjusting Electric Car Equipment to Unusual Conditions—The Results Obtained Justified the Electrification

By L. Geenens
Chief Electrical Engineer Hershey-Cuban Railway

IN THE July 28 issue of this paper the author described why the Hershey-Cuban Railway was built by the Hershey Chocolate Corporation, the power generation and transmission system used and how the special electrical conditions brought about by the tropical climate were met. In this concluding instalment an account will be given of the rolling stock used, the shops in which the cars and locomotives are maintained and some facts about transportation conditions on the line.



The Cut Sugar Cane Is Hauled to the Nearest Electric Railway Loading Station in Ox Carts

The line started electrical operation with fifteen motor cars, of which ten are straight passenger, three combination passenger and baggage, and two straight baggage. There is one tower car for line work. The specifications for the passenger and tower cars follow:

PASSENGER CARS

Manufacturer	J. G. Brill Co.
Seating capacity	50
Speed	40 m.p.h.
Weight	28,000 lb.
Length	49 ft. 3 in.
Width	8 ft. 6 in.
Trucks, type	Brill 27 X-MCB
Wheel base	6 ft. 3 in.
Wheels, diameter	33 in.
Distance, centers of trucks	26 ft. 4 in.
Control	PC-101 multiple control
Motors	Four—GE-263 (65 hp.)
Gear ratio	64/22
Headlight	Incandescent, 32 volts
Current collector	Pantograph
Air compressor	CP-29
Lightning arresters	Aluminum cell.
Length of seats	38 in.
Width of aisle	23½ in.

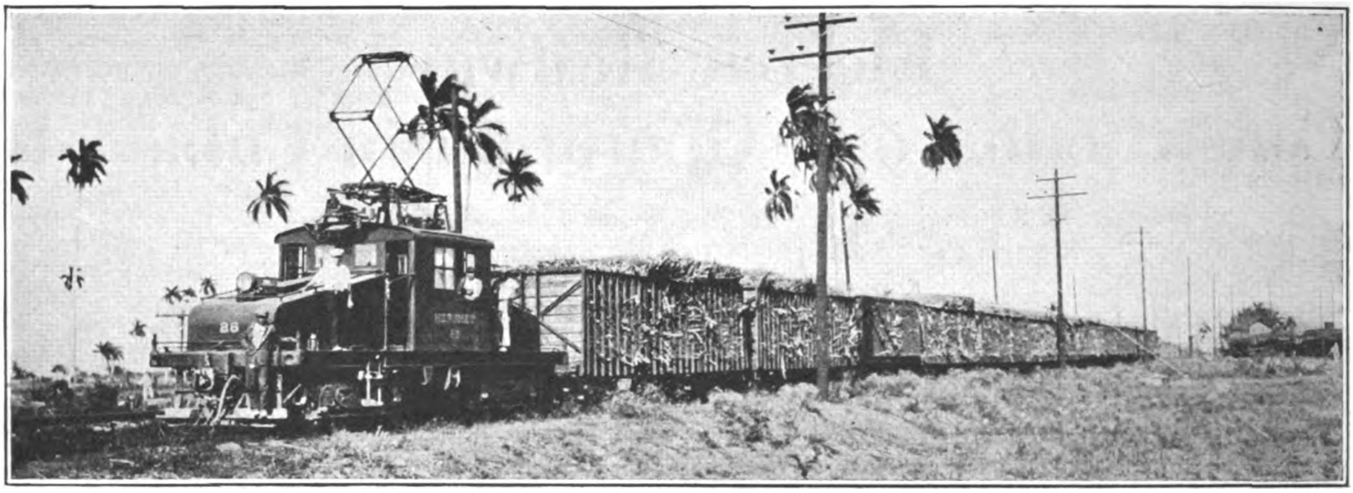
TOWER CAR

Manufacturer	J. G. Brill Co.
Length	40 ft.
Motors	Four—GE 263 (65 hp.)
Control	GE—K-47
Gear ratio	71/15
Headlight	Luminous arc, 600 volt

Each car has its own pantograph and carries in addition a trolley pole at each end for use on direct suspension overhead should it be needed to run the cars over tracks so equipped.

No power bus was provided for train operation. Only a 9-conductor 32-volt control cable runs through the train, together with the air-brake lines. It was soon felt that the existence of a power bus would have a marked advantage. Single car train are seldom run on the main-line service, there being always from two to seven or eight cars in a train. This means that with all pantographs up, the wear of contact strips and trolley wires is three times what it would be with one pantograph up for every three cars. Any obstructions in the way of the first pantograph will wreck not only this pantograph but usually all the pantographs of the train and thus cripple the train entirely. With only half or two-thirds of the pantographs up, there would be enough spares to continue the trip, and through the power bus the train would have full power in all the cars the same as before. If any pantograph of a train develops a defect during the trip, it can be lowered and another one raised without changing the driving power of the trains.

As 1,200-volt jumper cables are not desirable, a system was developed using the trolley poles already installed on the cars. The method is shown on page 213 and consists in the use of a ⅝-in. steel rod carried on a "boom" at each end of each car and extending out far enough to rest on the trolley wheel of the next car. Proper electrical connections are made on the roofs of the cars. This forms a connection of large capacity as it consists of two trolley wheels and poles in parallel.



One of the Electric Locomotives Leaving a Loading Station with Ten Cars Loaded with Sugar Cane

It is very flexible as the wheels rolling on the rods take up all the motion between cars. If the cars are uncoupled the parts will clear each other automatically. All high-voltage parts are out of reach of the public and are entirely safe for the train crews as they handle only the trolley ropes. The device takes the curves without any trouble and has been working to our entire satisfaction.

The cars in general have been giving good service and are well adapted to the requirements of the line. The only field for improvement in the design is the ventilation. In a tropical climate an effort to provide all ventilation by means of louvers or hinged sash in the monitor roofs is not a success. Aside from their high maintenance, due to the warping of the frames from dampness, they have to be closed at each rain. These rains occur with a suddenness and force unknown in Northern climates and it is usually impossible for the train crews to close so many hinged monitor sashes before the passengers are drenched. With all doors and windows closed and a normal temperature of from 85 to 95 deg. F. the condition inside the cars soon becomes unbearable. Powerful roof ventilators, thoroughly rainproof, would be a decided improvement.

During the winter months there are cold winds and heavy mists, which make the passengers close the windows, and the situation encountered during the rainy season is repeated. With the side windows closed it is too hot and with these windows open and the car running at high speed there is a violent draft all through it. A possible solution would be to make the lower car sash stationary and the top part slide up.

LOCOMOTIVES AND MACHINE SHOP

There are seven electric locomotives of 60 tons each, with the following characteristics:

Manufacturer	General Electric Company
Weight	60 tons
Motors	Four—251A
Control	Multiple unit
Compressors	Two—CP-30 of 35 cu. ft. each
Control power	600-volt dynamotor

The shop where the rolling stock of the railroad is maintained is in Central Hershey, alongside a well-equipped machine shop of 225 ft. x 38 ft. The latter shop is not a part of the car shop in that it has an independent force and carries out all the machine work needed for the car shop, sugar mill, power plant, agricultural department, etc. The car repair department sends its work to this shop through a system of work orders in the same way as other departments do. Hardly 40 per cent of the machine shop work comes from the car department, most of the remainder being repairs for the two sugar mills of the company. All machine tools in this shop are electrically driven with individual 440-volt three-phase induction motors. Two air compressors supply air for the car shop, machine shop, sugar mill and power house, a plan which eliminates the need of separate compressors for each of these departments.

A small foundry is operated in connection with the machine shop. Iron, brass and aluminum castings are made to replace broken parts, and enough new work is added to operate the foundry efficiently. When it is considered that it will take from one to two months to secure material on a rush order from the United States, it will be realized that a small foundry of this kind proves very handy for emergency repairs. It goes hand in hand with the acetylene and electric welding. A welder trained locally and handling both apparatus is working steadily, and at times a second operator is added.

The machine shop also takes care of the welding of broken rail bonds. For such repairs, the acetylene welding outfit is loaded on a gasoline-driven track automobile, and cylinders of compressed acetylene gas and oxygen are used. In the shop and around the mill and plant an acetylene generator, permanently mounted on a small track car, is used. A general repair of the bonding is made every year some time before the crop is gathered and ahead of the heaviest traffic.

There is no wheel lathe in the machine shop, as this work is easily handled on the heavy-duty 6-ft. lathe used for grooving the mill rollers. This lathe lies idle during the grinding season and by proper organization of the work, all wheel turning can be done during this period. This lathe is located in the mill room of the sugar mill, where a 20-ton crane is available for handling the work. When needed later, a wheel lathe will be installed.

The machine shop force also maintains and repairs the steam locomotives used on the cane supply tracks which are not electrified.

CAR SHOPS AND SHOP ORGANIZATION

The car shop itself is in a steel building 200 ft. long by 85 ft. wide, adjoining the machine shop already mentioned. It contains thirteen tracks, one drop pit for steam locomotives and four inspection pits. The car shop force maintains the rolling stock consisting of: fifteen passenger motor cars; seven 60-ton electric locomotives; 170 sugar cane cars; sixty box cars; twenty-five gondola cars; thirty-one flat cars; six cabooses; one locomotive crane; one wrecking crane; miscellaneous work-cars.

A superintendent of equipment is in charge of all operations in this shop and reports to the electrical engineer. His force is divided in three groups, as follows: the electrical group, the mechanical group and the car inspectors and cleaners.

The electrical group, composed of three electrical mechanics, maintains everything electrical on coaches and locomotives.

The mechanical group is composed of one foreman and from nine to twelve men, according to the work. Each man has a specialty. There are carpenters, riveters, boiler makers, air brake men, painters, etc. These men do everything which is not electrical, from renewing the rattan of seats in the coaches to changing bolsters, painting cars, picking up wrecks, etc. The rule is that each man must turn in a day's work, no matter what his trade is. It is not strange to see a carpenter handle a cold chisel or a painter drive rivets. The men are given every opportunity to learn. They are rated according to what they are able to do and not according to trades. The men like this system and the best results are obtained.

The third group is composed of train inspectors and car cleaners. There is a day and a night inspector at each terminal. All these men have passed through the shop and have practical knowledge of repair work both on freight cars and coaches. They take care of the interchange of freight cars with neighboring lines. These men have a fair knowledge of the electrical devices such as the renewal of contact strips on pantographs, replacement of fuses, etc. They are not relied upon, however, to maintain the coaches or locomotives, their work being more in the nature of a mechanical inspection, such as is done on passenger coaches on steam lines.

After a car has been on the road for fifteen days, covering some 3,600 miles, it is brought into the shop for one day and thoroughly examined. A competent man looks for worn or broken parts, loose bolts, clearances on side bearings, brake adjustment, leaky air pipes, etc. The electrical men examine the motors, commutators, brushes, control, lightning arresters, etc. The car is washed and disinfected; pantographs are tested for pressure against contact wire; brakeshoes renewed, etc. After this, the car is ready for another run.

Once a week, to supplement the inspections at the terminals, one of the three electrical mechanics from the shop is sent to these terminals to oil the journal boxes and renew motor brushes if needed. These are the only men authorized to oil journals, renew brushes and in general do work on the control devices of the cars and locomotives.

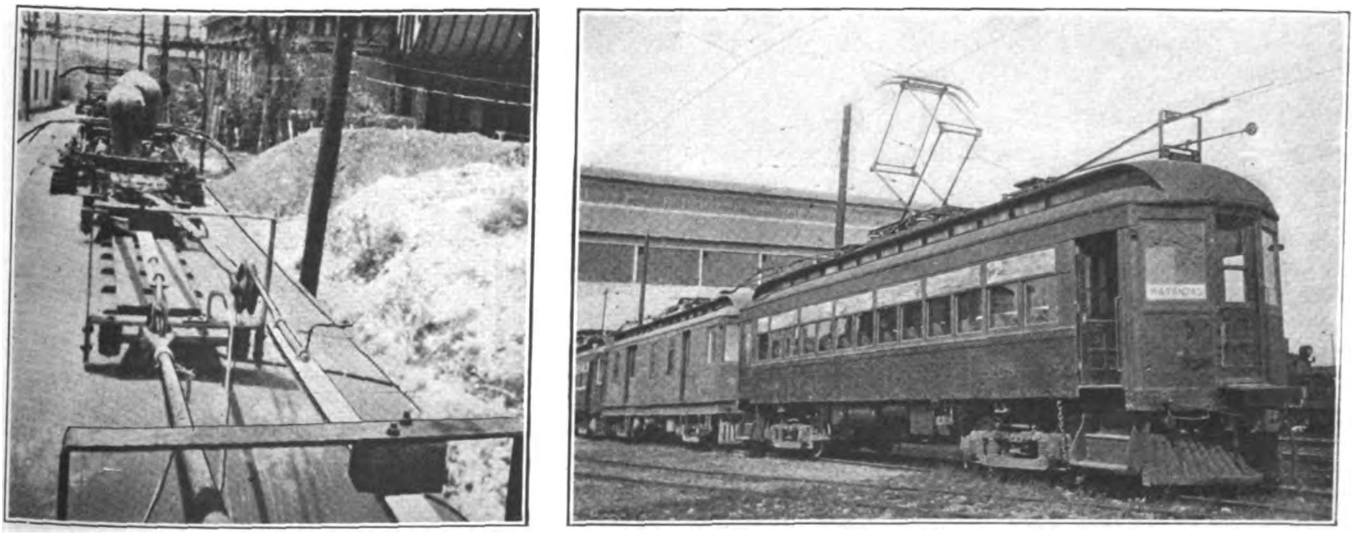
The electric locomotives cover some 2,000 miles before being inspected. The only work done during these runs is to change the brakeshoes, oil the bearings and adjust the brushes.

There is no night shift of any kind. The practice on steam operation of having hostlers and mechanics prepare the engines and attend to the departure of the locomotives has been entirely eliminated. The engineers take their cars and locomotives themselves. They have the keys of the doors. They raise the pantographs, fill the air-brake tanks and go off. A locomotive left in perfect working order by the shop force should remain in that condition for any length of time and therefore need no further attention when leaving.

A blackboard in the shop shows at all times the locomotives and cars ready for service. Special efforts are made to have as much of the equipment as possible in working order at the end of each day. All equipment which cannot be ready by night is reported to the traffic department with an estimate of the time during which the equipment will be out.

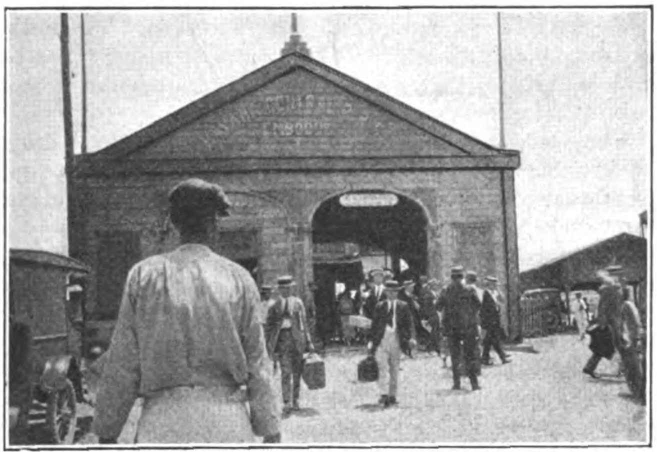
A general overhauling of each locomotive is done every two years during the non-grinding season when fewer locomotives are needed. They are taken out of service for one week. Unnecessary dismantling is avoided, parts which don't wear are not taken apart. The electrical control and the air-brake parts are left in place as all of these can be cleaned, inspected and tested while on the locomotives. The attention is concentrated on the driving motors and journals. Motors are removed, armatures and field coils are cleaned, painted and baked. Control coils are dipped.

It was found that at least twice a year all iron parts of the control of both locomotives and cars should be scraped and painted as a protection against rusting. Galvanizing does not last. There would be



At Right—A Three-Car Main-Line Train Operated from One Pantograph. The View at the Left Shows the Power Connection Between the Cars

a marked reduction in maintenance in the tropics if brass, aluminum or copper were used in place of iron in the control parts. This refers not only to controls for cars or locomotives but also for automatic substations. All magnet coils should be so thoroughly dipped or coated with weatherproof compounds that not the slightest moisture can penetrate. Resistance tubes for instruments or other purposes with the resistance wires exposed do not last over two years.



Passengers Leaving the Boat Landing at Casa Blanca to Board the Matanzas Train

When a passenger car is brought in for equipment overhaul the trucks are changed, and the car goes back in service after one day.

On both the cars and locomotives the oil in the air compressors is renewed every 20,000 miles. The crankcase is washed with gasoline and new oil introduced. This system has been most effective in keeping the bearings in perfect order. The locomotives have made more than 60,000 miles, and no shims have been removed as yet from the crank bearings of the compressors.

The locomotives, cars and automatic substations are still operating on the first set of contact tips on all the contactors after two years of service.

In an effort to counteract the rapid rusting of the steel cars used for hauling cane, the cars were sand blasted and afterwards sprayed with a blast of hot Mexican crude fuel oil atomized and heated with steam. This material has adhered to the surfaces better than any paint. Under the tropical sun it dries thoroughly within a couple of months. It is easily lettered with white paint. After one year of service, this coat was as good as new. The cost of material and labor was $1.35 per car.

TRAFFIC AND TRANSPORTATION

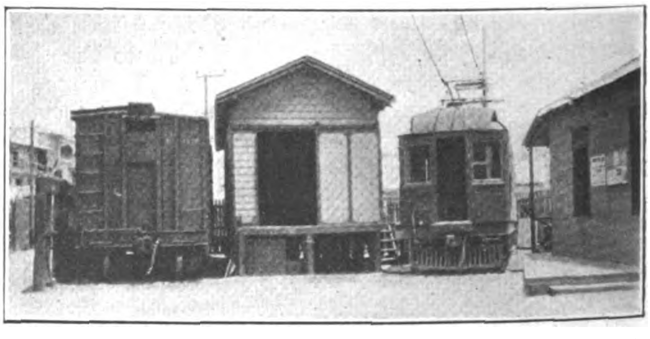
When the electric service on the line was begun the steam locomotive engineers who knew the road were broken in as operators of electric locomotives. They required the practice of only a few days with an instructor. It is remarkable how easily this change from steam to electric was made. Some engineers will still occasionally heat up the resistance grids by running on intermediate steps of the controller. In steam operation, every stop of the throttle is a running position, and they will forget this difference. They were eager to be assigned to electrical equipment. Most of the steam equipment was old, and it needed considerable attention and repairs on the road to keep it going. This meant longer hours, much dirt, heat, and in general, harder work without seeing results.

Steam engineers make the best operators for electric locomotives. They are fundamentally mechanics, used to harder conditions than are generally encountered in electric service, and they know how to handle trains on the road, which is far more important than to know the details of their locomotive. We take it for granted that in most cases they cannot make repairs of the electrical equipment on the road. We don't expect them to, and in case of failure spare equipment is immediately substituted. We consider that the electrical equipment must be so perfected and foolproof and so well maintained that these failures on the road are very exceptional. The methods of maintenance are established from the expérience obtained from these failures. This procedure eliminates a considerable amount of teaching to new motormen while it throws more responsibility on the shop force.

There are six passenger trains each way daily. These trains make the trip from Casa Blanca, across the bay from Havana, to Matanzas, 56 miles, in two hours and fifteen minutes, with six official stops and twenty-five flag stations. They run at an average schedule speed of 25 m.p.h. These trains are composed of from two to four cars and occasionally six and eight to handle excursions.

At Casa Blanca the trains stop in front of the ferry landing of the Havana Central Railroad and the schedules are so arranged that the passengers to and from Havana make connection at this point. Arrangements between the two companies permit tickets to be sold and baggage checked at the Havana landing for any destination along the line. Passengers for Havana are provided with tickets in two parts, one of which is kept by the conductor on the train and the other is collected at the ferry. The railroad company transfers the baggage between train and ferry.

Excursion trips are organized during the winter season between Havana and Central Hershey for tourists wishing to visit the sugar mill in operation. The trip includes the transportation, a conducted visit of the mill, lunch at the Hershey Hotel operated by the company, and an automobile trip through the surrounding country, particularly the tropical gardens around the water pumping station which are being developed into an amusement park.



Freight Station at Casa Blanca with an Express Car on One Side and a Freight Car on the Other. Merchandise Is Received at the Front of the Station

Central Hershey has become a favorite excursion place for clubs and schools from Havana and Matanzas. There are baseball grounds, race tracks, tennis court, dancing hall. Saddle horses can be hired for trips through the surrounding hills. Although no special efforts have been made to develop these amusements, it quite often occurs that all the cars are required to handle these crowds. The average number of passengers carried per month is 37,000, and the average length of ride per passenger is 16 miles (27 km.). The freight movement over the line consists principally of the transportation of sugar cane from the loading stations to the sugar mill. From 1,800 to 2,000 tons of cane are brought from the fields daily in specially constructed railroad cars made to handle this bulky material. The 60-ton locomotives are able normally to haul eight loaded cane cars over the heaviest grade of an average of 2.5 per cent extending for 4 km. From four to five cane trains are run daily, and their schedule is arranged to suit the most efficient load condition at the power plant. Branch lines used exclusively for hauling cane during the six months of grinding season are not electrified because the economy to be derived from electrical operation on these lines does not justify the investment in overhead lines and power plant capacity. The cost of material and labor for electrifying, according to the standard type of construction on this road, and including a feeder, is $5,000 per kilometer, or $8,000 per mile. This figure does not include power plant and substation equipment nor transmission lines. Two steam locomotives are used for these branches. They distribute the empty cars and bring the loaded cars up to the main line from where they are handled with electric locomotives. These branches are merely industrial sidings as they are not open for public service.

A through train of coal cars leaves the Havana terminal daily and is delivered at Matanzas for shipment towards the interior of the Island. There is also a miscellaneous freight train running from each terminal daily. The railroad operates its own express service, which is practically the only means by which small packages can be delivered in the country.

The whole line was never operated by steam with the traffic as now existing, and therefore there are no definite comparative figures on fuel consumption, payroll, etc. However, some comparisons are interesting. The sugar crops of 1919 and 1920 were gathered with steam locomotives, and the fuel oil consumption during those crops was nearly the same as is now being used in the power plant, which supplies not only the power for moving the crop but also the power for two to four freight trains and twelve passenger trains daily and more than 400,000 kw.-hr. per month of outside load. This is not surprising in view of the utter inefficiency of oil-fired locomotives in the hands of native firemen entirely ignorant of the most elementary laws of combustion. Then, also, it should be considered that a passenger coach which takes 80 kw.-hr. to go from one end of the line to the other, thus using 15 gal. of oil, is consuming only as much oil as would be needed on a steam locomotive waiting in a siding for half an hour or so. Altogether, counting the oil used for fuel in five or six steam locomotives during the time that they are not moving, we can easily conceive that this oil, added to the oil wasted on these locomotives through bad combustion, will be sufficient to move the additional tonnage and produce the extra power mentioned before.

An immediate result of the electrification was the elimination of the pumping stations required by the steam locomotives. Ten such stations existed, of which six had elevated tanks and permanent operators, while the others were steam pumps run from the steam locomotives themselves. Stations with operators cost more than $1,000 a year. During the dry season considerable trouble was experienced due to lack of water, while some of the waters were corrosive. There are now only three emergency stations consisting of hose connections from city water mains, one at each terminal and one at Central Hershey.

Department Heads in Boston Inspect Property

THERE was an innovation in the practice of the Boston Elevated Railway on July 27 when the department heads took a tour around the property together to visit points of particular interest at the present time. A day was taken for the trip which was made in one of the company's buses. The first point visited was the South Boston power station, where foundations are being laid for a new 35,000-kw. turbine, condensing water tunnel, etc. A stop was also made at the division headquarters on Park Street, where the company has recently installed a passenger waiting station and a handball court for the employees. The next stop was at the Cedar Grove station of the Shawmut Branch Railroad, whose operation is to be taken over by the Boston Elevated Railway. Other stops were at the Lake Street car yard, the new Allston garage, the Bennett Street car yard and carhouse at Cambridge, the Harvard Square station of the Cambridge rapid transit line, the foundations for the new repair shop at Everett, the new Salem Street division headquarters in Medford and elsewhere.

A group view of the party, taken in the yards of the South Boston Station is presented. Left to right they are H. M. Steward, superintendent of maintenance; Edward Mahler, purchasing agent; H. W. Blake, ELECTRIC RAILWAY JOURNAL; C. W. Mulcahy, assistant general counsel; John Lindall, superintendent rolling stock and shops; James Smith, superintendent of transportation; Edward Dana, general manager; C. W. Learned, superintendent of inspection; H. W. Putney, secretary of the transportation department; H. B. Potter, assistant general manager, and F. S. Freeman, superintendent of power.

Boston Elevated Railway Officials Visit South Boston Power Station While on Tour of Property in Bus

The opportunity afforded to the heads of the departments of discussing on the ground the effect of new developments under way or contemplated proved so satisfactory that similar trips will probably be taken in future, perhaps periodically.

Utilizing an Unusual Carhouse Site in East Providence

The United Electric Railways Is Constructing a Large Carhouse with Excellent Facilities for Inspection and Maintenance

THE United Electric Railways, Providence, R. I., is spending several millions of dollars in improvements this year. Among the structures under construction is a carhouse with capacity for ninety-eight 40-ft. cars, located in East Providence. This is of special interest because the directors of the company insisted that it be constructed at the absolute minimum of expense. Hence, among other items, the square tower at the corner, a feature of most of the company's carhouses, was omitted and every detail was studied with a view to elimination of any unnecessary cost.

The building is more than 460 ft. long over all and nearly 170 ft. wide at the front. It contains two six-track bays separated by a fire wall and a two-story row of offices, shops, etc., on one side as indicated in the plan and sections reproduced.

The doors inclosing the portion of the structure used for inspection are about 100 ft. inside the front end, decreasing the amount of building to be heated but providing shelter for two dozen cars. This part of the building has a 4-in. tar concrete floor, but no pits.

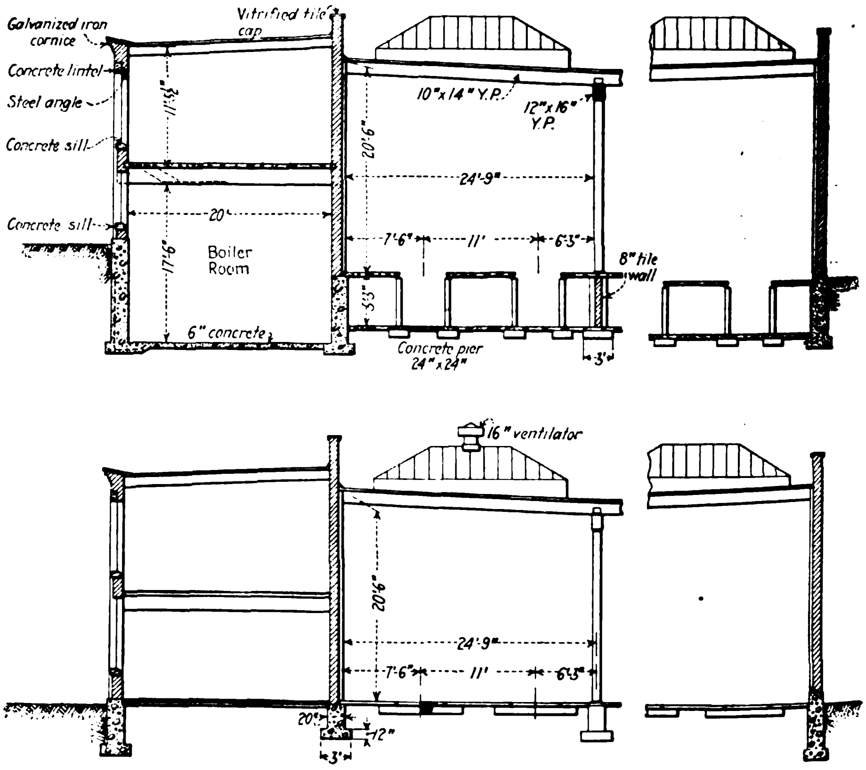
Behind this open section in the second bay is a 180-ft. pit section, for general inspection work only, and behind this is another large tar-concrete floor section for car storage. These sections are separated from the front open section by doors hung from roof-supporting columns.

Behind the open sections of the bays all tracks are provided with pits. Here are facilities for changing wheels and armatures, etc. Pit hoists are provided in two pits, a wheel grinder in another, and a large general repair shop, centrally located, is equipped to handle all ordinary maintenance work.

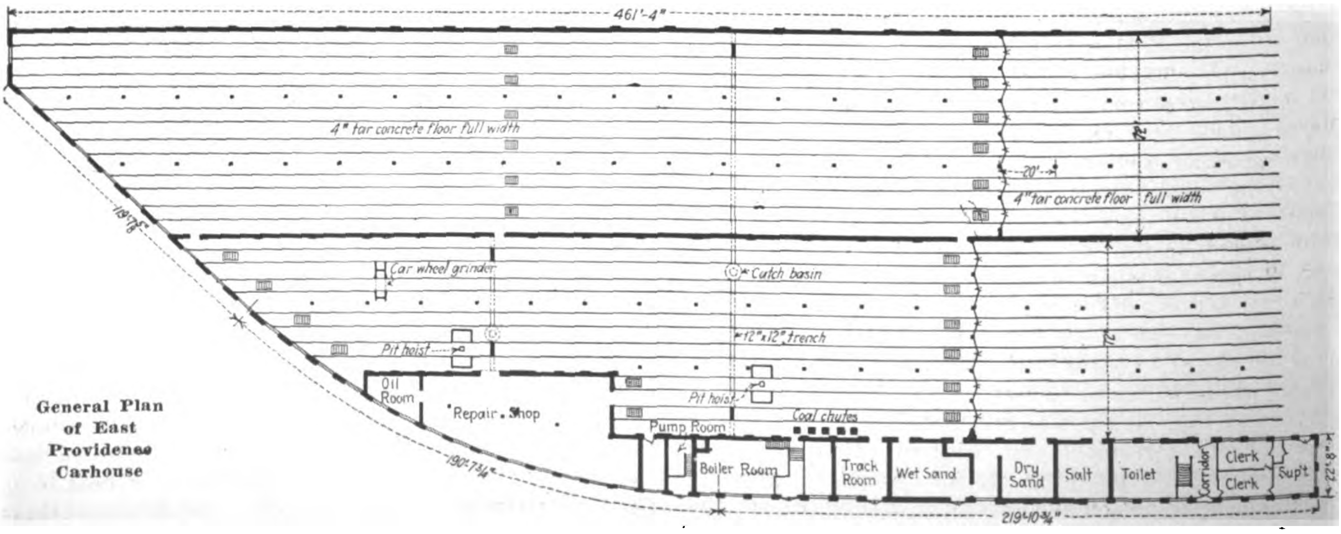
In conformity with the economy program, slow-burning mill construction was selected. The roof is of 3-in. yellow pine planking covered with tar and gravel. This is carried on heavy timbers supported on 10-in. x 10-in. yellow-pine columns spaced 20 ft. apart along the length of the building and 24 ft., more or less, across it. A liberal installation of metal skylights in the roof insures an ample supply of daylight, and a sufficient number of ventilators have been installed to provide fresh air.

For fire protection a sprinkler system is the main dependence. It is supplied from a reservoir located under the floor of the repair shop.

In the pit sections the track rails are mounted on 4½ in. round cast-iron columns, with ½-in. shell. The base of the column is a 12-in. flat plate with brackets cast on the four diagonals. At the upper end the column terminates in a flat plate 10 in. long and about 6 in. wide. In order to insure uniformity in the height of the columns and squareness at the tops, the tops are given a light cut in the machine shop.


Galvanized iron cornice
Vitrified tile cap
Concrete lintel
Steel angle
Concrete sill
Concrete sill
11'-5"
17'-6"
20'
Boiler Room
6" concrete
10"x14" Y.P.
12"x16" Y.P.
20'-6"
24'-9"
7'-6"
11'
6'-3"
5'-3"
8" tile wall
Concrete pier 24"x24"
3'
16" ventilator
20'-6"
24'-9"
7'-6"
11'
6'-3"
20"
12"
3'

Cross-sections of the Carhouse
Above, through pits; below, through open section


461'-4"
4" tar concrete floor full width
119'-7⅝"
20'
4" tar concrete floor full width
72'
72'
Car wheel grinder
Catch basin
12"x12" trench
Pit hoist
Pit hoist
Oil Room
Repair Shop
Pump Room
Coal chutes
Boiler Room
Track Room
Wet Sand
Dry Sand
Salt
Toilet
Corridor
Clerk
Clerk
Sup't
22'-8"
190'-7¼"
219'-10¾"

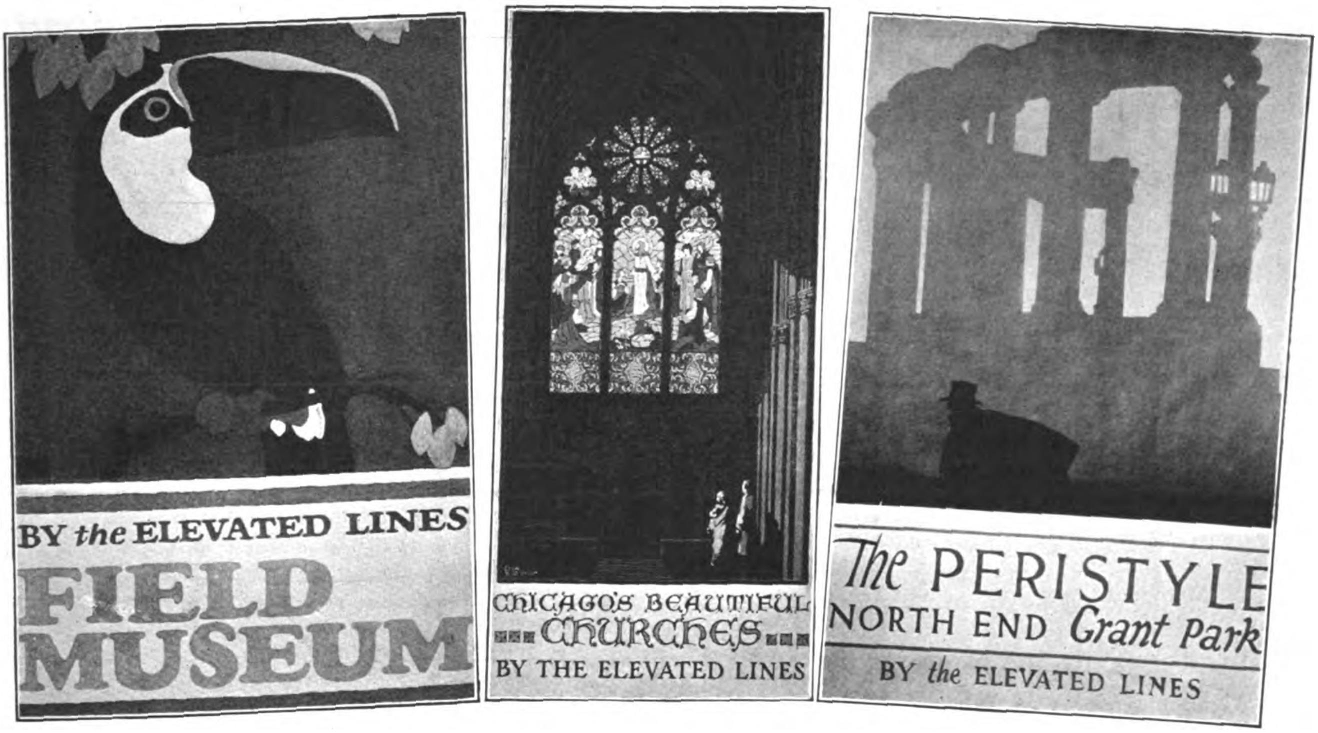
General Plan of East Providence Carhouse

The base plates rest on concrete piers 24 in. x 24 in. in size and they are embedded in the concrete floor of the pits. On the upper plates rests the 8-in., 79-lb. rail, to which they are bolted with four heavy cap bolts for each column. The rails, in turn, support a reinforced concrete floor in the manner shown in a detail reproduced. The rail level is 4 ft. 9 in. to 5 ft. 3 in. above the pit floor.

This form of construction is so rigid that no side bracing is necessary. It provides an open area in the pits facilitating cleaning and rendering all of the basement space accessible.

Merchandising Transportation on the Chicago Elevated Railroads

Posters, Newspaper Advertising and Motion Picture Films Present Advantages of "L" Transportation as Well as Increase Friendly Feeling and Better Public Relationship



Done in Beautiful Colors, These Posters Advertise the Chicago "L"

ACTING on the theory that modern merchandising methods are as applicable in selling transportation as they are in selling dry goods or groceries, Britton I. Budd, president Chicago Elevated Railroads, some time ago created a commercial department having this function. Such a step was taken when it became imperative to increase riding on these lines, following a cut in fares which went deeper than a companion cut in wages. The only means in view of caring for the apparent deficit was by increased riding.

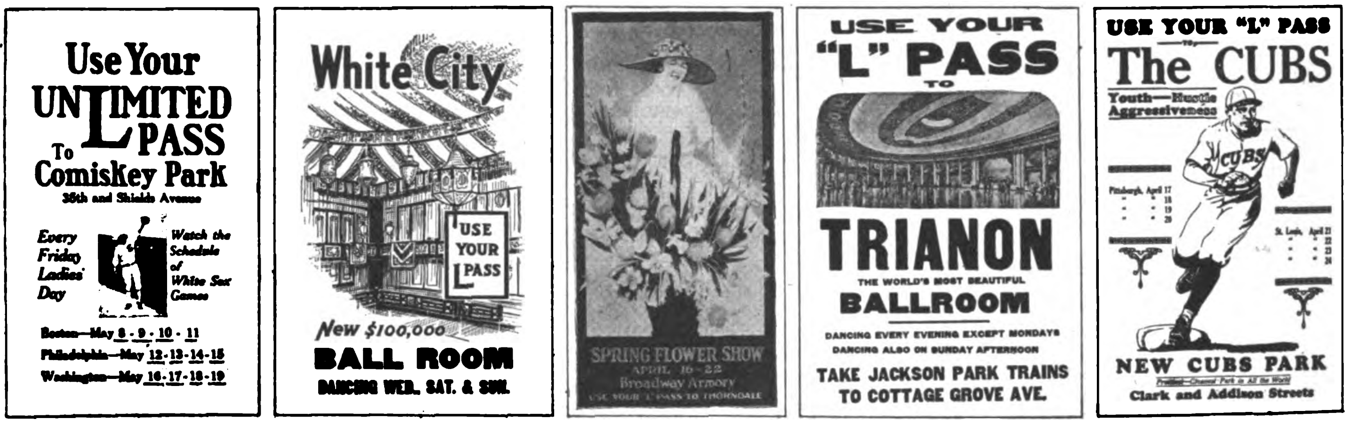
Every method known in modern advertising was immediately begun by John J. Moran, head of the department, following his appointment. The "weekly pass," new to the Chicago public, which was also instituted as a fosterer of increased riding, was made the chief "selling" argument. "L" patrons had to be educated in its uses. A campaign of newspaper advertising in the big local dailies, as well as foreign language papers, was the first step in Mr. Moran's work. Announcements of the new form and rates of fare were made with ideas and suggestions for the use of the pass as adjuncts. This was complemented by handbills, car and station cards and posters in the windows of the cars. A direct-by-mail campaign was also begun. When a man moves into a territory served by the Elevated he is greeted by a friendly letter welcoming him to the community and setting forth the excellence of the elevated service. This campaign has been found very valuable and is being continued on a large scale.

Probably the most valuable form of advertising ever developed by a transportation system, and the cheapest, is an outgrowth of the weekly pass, known as "co-operative advertising." It is plain to the regular patron on the Elevated that he may obtain additional rides for a slight cost in addition to what he formerly had to pay for his travels to and from work. To cultivate this off-peak traffic was the initial work of the commercial department and the work upon which its efforts were centralized. It was found comparatively easy to prove to the owners of the large motion picture houses, dance halls, theaters and other places of amusement in Chicago that the holder of an unlimited ride "L" pass would be a profitable person to appeal to in their advertising, because he would have to pay nothing extra for transportation to reach their establishments.

In advertising to reach customers for the weekly pass space was utilized in stations and on trains which had formerly gone to waste as far as advertising purposes were concerned, and Mr. Moran was able to enter into co-operative arrangements for this advertising with most of the larger and more desirable places of amusement, known to be most progressive in their advertising. Some of the examples of this method of advertising and the value of the results follow:

CO-OPERATIVE ADVERTISING WITH THEATERS, MUSEUMS AND CIRCUSES

It had been the custom of the Elevated roads for the past eight or nine years to carry a painted wooden sign on the "head end" of each train announcing ball games at the two big league parks in the city. During the winter, necessarily, these signs were not used. The owners of the largest string of motion picture theaters in Chicago asked for this space, giving in return a 50-ft. motion "trailer" on the end of their feature picture, a concession for which they had repeatedly turned down large monetary offers. The "trailer" film read simply "It costs you nothing extra for transportation to visit this theater if you use your unlimited-ride weekly 'L' pass." This message reached more than 500,000 persons weekly through this medium.


Use Your UNLIMITED L PASS To Comiskey Park
35th and Shields Avenue
Every Friday Ladies' Day
Watch the Schedule of White Sox Games
Boston—May 8 - 9 - 10 - 11
Philadelphia—May 12-13-14-15
Washington—May 16-17-18-19
White City
USE YOUR L PASS
New $100,000
BALL ROOM
DANCING WED. SAT. & SUN.
SPRING FLOWER SHOW
APRIL 16-22
Broadway Armory
USE YOUR "L" PASS TO THORNDALE
USE YOUR "L" PASS TO
TRIANON
THE WORLD'S MOST BEAUTIFUL
BALLROOM
DANCING EVERY EVENING EXCEPT MONDAYS
DANCING ALSO ON SUNDAY AFTERNOON
TAKE JACKSON PARK TRAINS TO COTTAGE GROVE AVE.
USE YOUR "L" PASS TO The CUBS
Youth—Hustle Aggressiveness
Pittsburgh, April 17
18
19
20
St. Louis, April 21
22
23
24
CUBS
NEW CUBS PARK
Clark and Addison Streets

These Posters Advertise Special Attractions as Well as the Value of an "L" Pass

Another motion picture combine granted Mr. Moran the same privilege for this "trailer" in return for window posters in cars and stations. This firm operates a chain of sixteen motion picture theaters in Chicago. In both instances the cost to the Elevated was merely that of the trailer, a small sum, the picture houses bearing the cost of printing and painting the signs. When it is realized that this movie concern rejected an offer of $10,000 for a week's showing of a similar "trailer," the significance of this advertising may be readily appreciated.

The field of operation in co-operative advertising was found to be very broad. The Field Museum, the Art Institute, the Chicago Historical Society and other civic centers of education and culture, as well as some of the churches, were quick to realize the importance and value of such advertising, and their response to suggestions by Mr. Moran has been marked.

When the circus came to town a large banner bearing the legend "Two World Leaders: Chicago Elevated Weekly 'L' Pass and Sells-Floto Circus" was exhibited in return for station cards advertising the show. Several dance halls have offered passes for prizes in their competitive contests. Many motion picture theaters have admitted the holder of an "L" pass free during a stated period. The value of this concession to the Elevated management as a good-will builder cannot be overestimated.

A survey of the elevated stations has been made by the commercial department and vantage points for the station cards chosen. Every turn a patron makes, from the time he enters the station until he reaches the train platform, he is greeted by a card or poster. Metal frames have been installed in which the cards fit snugly, insuring neatness, ease of placement and uniformity.

THE POSTERS ARE ARTISTIC

Art was formerly far without the scope of an electric railway. It is surprising, therefore, to note the ease with which the Chicago Elevated has adopted it in its advertising. Mr. Budd, acting on the lead of the London Underground, inaugurated a series of beautiful posters pointing out to Chicagoans the attractive spots of their city. Under the management of Mr. Moran, who took this work over as part of the commercial department, the splendid standards set by Mr. Budd have been maintained. The posters, some of which are presented herewith, carry a minimum of wording which does not interfere with the artistic designs.

Because of their individuality and newness in the field, many requests have been made by the public for samples of the posters. Schools, artists' exhibits and meetings and private individuals all over the country have made use of them for various purposes. The value of such posters in schools, where many were used as models in art classes, is apparent. The minds of the children, being in their formative period, quickly grasp the idea and lasting impressions are made.

Many words of praise from art institutions, artists' periodicals and advertising publications have been given the Elevated posters. Perhaps the most pointed of these was given by Lorado Taft, famous sculptor and artist, in a talk before the advertising council of the Chicago Association of Commerce recently while speaking on "Art in Advertising." "I look with interest on advertising posters," said Mr. Taft, "and there are some beautiful things appearing now and then, some of which are really perhaps our furthest advance in art. It is what we need all the time. There is a poster just out here and I would like to meet the man who drew it. I would like to speak to him. I haven't the least notion who he is, but they have got a good man at work advertising our elevated railroads, telling you what you can find in the city. The poster I refer to is the Peristyle at the north of Grant Park—that moonlight and the columns there." This may be considered doubly important because of the recent move against unsightly billboard and poster advertising in the Illinois Legislature as well as in several other states.

The posters are in two sizes, known as three-sheet and one-sheet. The former are 42x84 in. and the latter 28x42 in. in dimensions. The work is done by the best Chicago artists, many recruited through the aid of the Art Institute, which heartily approves of the work done. Mr. Moran has followed the practice of allowing the artists free sway with their imagination as far as execution and ideas are concerned, usually merely suggesting the subject. Upon acceptance of the design the artist is remunerated for his efforts. Competitive bidding by the several lithographing companies is asked by the department before contracts for printing are let.

A NEW USE FOR YOUR
"L" PASS

FOR ONE WEEK
STARTING SUNDAY, MARCH 11,
THE
RANDOLPH THEATER
(STATE AND RANDOLPH)
WILL HONOR YOUR "L" PASS
AS ONE-HALF OF REGULAR
ADMISSION PRICE

An Unusual Privilege Granted to "L" Passholders by a Prominent Theater

Many of the designs submitted by these artists are used in billboard advertising of the Elevated. Contracts for boards in desirable places throughout Chicago are made with the Thomas Cusack Company, which applies the designs furnished, as well as executing many original designs. The subjects of these boards are usually points of interest in Chicago, such as railroad stations, shopping districts and places of amusement. These advertisements are more general in their character than the printed posters, the showing of which is confined to Elevated property.

As a sample of the good-will building faculties of the Elevated posters, Mr. Moran tells of an incident which occurred at a football game at the University of Chicago last fall which was attended by many persons from outside of the city. In order that traffic might be directed to the Elevated, several blocks distant from Stagg Field, Mr. Moran had a number of signs painted bearing a large arrow and the word "Elevated" in large letters. "We were placing these around the field by driving pointed sticks, on which the signs were mounted, into the ground," said Mr. Moran, "when a groundkeeper came running up and said such tactics were strictly against the rulings of the university. It so happened that we had recently featured the university in some of our advertising posters and I referred the man to the head of the public relations department of the university, who was acquainted with what we had done. As a result of an interview with him, we were allowed to continue unhampered."

COST OF CONDUCTING COMMERCIAL DEPARTMENT

Figures as to the operating cost of the commercial department of the Elevated are not obtainable as yet because of its short life. It is the consensus of opinion of the management and executives, however, that it has paid for itself many times over in value received. The results are hard to set down in cold figures. In increased riding the gain is apparent, as well as an increase in friendly feeling and better public relationship. When children in their schools are taught the use of the Elevated and citizens of Chicago inspired with civic pride by the portrayal of their city's accomplishments in the line of beautiful parks and buildings, the Elevated has established itself in the hearts of the people in such a way that no amount of adverse criticism or petty politics can discredit it.

The Economic Situation of the Swiss Railways from 1913 to 1920

THE full text has just been made public of a résumé of the economic status of the Swiss railroads from 1913 to 1920, presented in abstract at the last International Street Railway convention in Brussels by Charles Rochat, general manager of the Geneva Electric Tramway Company. It is a volume of 112 pages and goes exhaustively into the subject of the economic situation of the trunk line railroads, mountain railways and tramways in Switzerland. The accompanying table gives some of the data on tramways contained in it.

In commenting on the situation Mr. Rochat says that the railroads in Switzerland before the war generally had a good financial status, but the war completely changed conditions and imposed a number of problems most difficult to solve. Surrounded as it was by four belligerents, France, Germany, Austria and Italy, Switzerland suffered greatly from the restrictions of imports and exports made by them, so that costs of supplies greatly increased, particularly of coal, oil and metal objects. At the same time the requirement of maintaining an army made labor scarce. The table shows the effect on expenses of these two items

An added factor, however, was new laws passed in regard to the hours of labor after the armistice, particularly the introduction of the eight-hour day. To the establishment of this condition may be attributed in large measure the resulting high expenses of operation and it has been the principal obstacle to a reduction in fares.

TABLE SHOWING STATISTICS OF SWISS TRAMWAYS, 1913 TO 1920 INCLUSIVE

	1913	1914	1915	1916	1917	1918	1919	1920
Length of line operated (in km.)	468	468	484	487	487	484	492	492
Passengers carried (in millions)	149.5	144	133	157	181	197	206	191
Passengers per car (or train) kilometer	4.7	4.7	4.4	4.7	5.3	5.7	5.7	5.5
Receipts from passengers (in millions of francs)	17.64	16.86	15.64	18.60	21.94	25.62	35.62	41.10
Receipts per passenger (in centimes)	12	12	12	12	12	13	17	21
Receipts from all sources (in millions of francs)	18.37	17.55	16.36	19.40	22.86	26.74	36.87	42.54
Operating expenses (in millions of francs)	14.99	14.74	14.04	15.68	18.32	24.60	34.89	38.73
Division of operating expenses in per cent of total:								
General	3.85	3.9	4.0	3.7	3.65	3.45	3.2	3.35
Maintenance of way and structures	14.2	12.6	11.6	10.6	10.5	10.3	12.0	12.2
Conducting transportation	23.0	24.0	24.5	24.0	25.0	25.0	28.0	27.0
Power and shops	51.0	51.0	52.5	53.0	52.0	48.0	47.0	46.5
Miscellaneous	7.0	8.0	7.4	8.7	8.7	13.0	9.3	10.5
Operating ratio (in percent)	81.57	83.97	85.80	80.80	80.10	92.0	94.6	91.0
Number of employees (in thousands)	4.58	4.79	4.70	4.82	4.94	5.35	5.56	5.50
Employees per 100 car (or train) km	5.3	5.7	5.7	5.3	5.3	5.7	5.6	5.8
Average cost of electrical energy in centimes per car (or train) km	8.1	8.0	7.9	7.9	8.1	8.0	8.1	8.4

The Readers' Forum

High Operating Cost Emphasized as Cause of Failure

American Electric Power Company
Philadelphia, Pa., Aug. 7, 1923.

To the Editors:

I want to call your attention to the editorial in your issue of Aug. 4, entitled "Why Jersey Central Traction Company Has Been Abandoned."

It seems to me that while the facts alluded to in the editorial are all true and contributing causes to this abandonment, nevertheless, you have overlooked the really fundamental cause, and that is the abnormal rise in the cost of operation, particularly the wage cost. There are, unquestionably, in the country many roads which from twenty to thirty years ago would live, serve the public and produce a small return upon the investment, but which today cannot at any fare which the public will pay meet the increased cost of operation, more particularly, the payroll.

It seems to me from the standpoint of the industry that this point should be given due emphasis and not ignored entirely, and it is a point which I have been very careful to emphasize in all the discussion and proceedings which have led up to this abandonment.

C. L. S. Tingley, Second Vice-President.

[The editors have not been unmindful of the important effect of increased costs of operation in this, as in other instances, but the outstanding cause here seemed to be the steadily decreasing patronage of the railway.—Editors.]

Car Weight Important as Element of Rail Wear

City of Detroit
Department of Street Railways
Detroit, Mich., July 26, 1923.

To the Editors:

The article on rail head wear, by Charles H. Clark, together with the editorial comment, appearing in the July 14 issue of the Electric Railway Journal, demonstrates the necessity of a comprehensive, unbiased and exhaustive investigation of not only the wear on the rail head from the number of cars which pass over it, including their weights and speed, but, in addition, the effect of weight of equipment on rails and the structures associated with them. R. B. Holt in his book, "Tramway Track Construction and Maintenance," has devoted two chapters to the subject of rail wear and rail corrosion; and numerous articles have appeared from time to time in the Electric Railway Journal bringing out to some extent the effect that the weight of equipment has on track structures as well as rail wear only.

The recent article confines itself exclusively to one type of rail, which type has less tendency to wear from vehicular traffic than the girder type more generally in use by street railways. A comprehensive investigation would cover all types of rail in general use.

From this article we infer that, given the number of wheels passing over a track, together with the depth of the rail head, the life of the track can be determined at once. This seems neither reasonable nor logical since there are numerous instances where the track life is well advanced though not due to rail wear. In order to estimate the life of a track structure it will be necessary to take into consideration other factors besides the number of wheel passes and rail-head depth.

It seems, therefore, that the effect of the weight of equipment and its relation to track as well as rail wear has not been taken into consideration. While it is true that when moving, a car possesses kinetic energy equal to one-half its mass times the square of its speed, and that, to stop the car, this kinetic energy must be absorbed, still this energy is not all absorbed by the track or rails. The question of impact, or the dynamic effect of a rolling load, would seem to have as much bearing on the life of the track structure as does the kinetic energy. Impact varies directly as the mass; consequently, a heavier car would cause greater initial damage, and the cumulative effect would increase much more rapidly than with a lighter car. Track deterioration from this cause would come from joint wear, inequalities in the rails and equipment, foreign matter on the rails, and irregularities in the track and rolling stock. This would effect the entire track structure.

That speed has little or no effect so far as impact is concerned, is brought out by F. E. Turneare and by E. H. Stone, in Vol. XLI of June, 1899, "Transactions of A.S.C.E.," and by F. W. Gardiner in Vol. LXXXIV, of 1921 "Transactions of A.S.C.E."

It would seem that the question as to whether tracks may be of lighter construction for the light-weight cars at present in vogue is one relating more to pavements and track structures than to rail-head wear. In this connection it would be interesting to have some information regarding the equipment passing over the worn rail section illustrated in Mr. Clark's article on page 47, since the illustration indicates a much greater wear per million wheel movements than the two instances noted in the text; namely, $\frac{7}{16}$ in. per 21,000,000 passes.

Mr. Clark has not mentioned the effect of grade or curvature, nor difference in the elevation of the two rails, nor has he made mention of the vehicular traffic, whether rubber or steel tired, in connection with rail wear. The composition of the rail would also have considerable bearing on the rail wear, as would the loss of metal from the corrosion of rails due to coal and other gases, particularly sulphurous gases from the burning of bituminous coal.

That not only our track engineers, but also the men in charge of equipment, are interested in this question is evidenced by articles in the Electric Railway Journal, from which a few quotations are included.

Dec. 11, 1920, Vol. 56, page 1195; extract from remarks by Frank Walker:

> Actually it was found that the safety cars were very easy on the track and the repairs required light. In some track formerly discontinued but now being rehabilitated for one-man car operation the company is putting in ties 5 ft. apart.

April 16, 1921, Vol. 57, page 736; extract from article by J. C. Thirlwall:

> The effect of weight on track and equipment maintenance is more difficult to determine. Obviously with light cars, the special trackwork, rails and joints will last longer and tie spacing can be increased, and with any given truck and motors, the lighter the body the longer the life of wheels, axles, truck members, brakeshoes and motor insulation. The longer and wider the body, the more it costs to repaint it and make the ordinary running repairs.

April 30, 1921, Vol. 57, page 820; extract from "Letters to the Editors":

> I, therefore, estimate that of the 65 per cent of the total which goes into track maintenance about 40 per cent is caused by weight, or approximately 25 per cent of the total.

May 28, 1921, Vol. 57, page 984; in an article by C. T. Dehore it is noted that the cost of maintenance of track and roadway per car-mile was 5.3 cents while the company was operating old-type heavy cars as against 4.95 cents with new light-weight cars. Also the proposed tie spacing was 3 ft. as against the existing 2-ft. spacing.

June 18, 1921, Vol. 57, page 1128; extract from article by W. G. Gove:

> The track maintenance saving is prominently indicated, although I do not recall any figures on the subject.

Oct. 2, 1920, Vol. 56, page 644, in an article by J. C. Thirlwall, it is shown that the cost of maintenance of way and structures per car-mile is 1.6 cents for safety cars, 3.3 cents for two-man cars, or a saving of 52 per cent.

Oct. 16, 1920, Vol. 56, page 785; in an article by R. Gilman Smith, the same cost is given as 2.5 cents for standard double-truck cars and 2 cents for standard safety cars.

June 3, 1922, Vol. 59, page 894. Extract from staff article on Kentucky Traction & Terminal Company, Lexington, Ky.:

> The savings in car and track maintenance can only be determined in the future operation of the property, except that the company believes that when new ties are laid the spacing can be increased to from 34 in. to 36 in. from the 24 in. now used.

July 8, 1922, Vol. 60, page 49; extract from editorial:

> Such cars will decrease operating expenses directly per car-mile . . . . by decreasing the wear and tear on the track . . . .

Jan. 22, 1921, Vol. 57, page 177; extract from article by Harry L. Brown:

> The track, much of which was open, was in bad condition, and while the old single-truck cars rode so roughly as to be dangerous, the safety cars, operating at higher speed, negotiated the rough track with no discomfort to passengers. Furthermore, the voltage drop on the line with the old cars was excessive, but with the new cars, fewer in number and each pulling less current, the voltage drop was not unsatisfactory. Thus the installation of safety cars enabled the company safely to defer track repair expense and avoid more investment in overhead copper.

Jan. 1, 1916, Vol. 47, page 21; extract from article by W. A. Haller:

> Light efficient cars tend to reduce construction and operating costs in many ways, chief of which are the following:
>
> 3. Reduction in track maintenance cost, due to lighter weight and less pounding on special work and no slipping on curves.

June 14, 1919, Vol. 53, page 1182; extract from letter to the editors by R. C. Cram:

> While you are pleading for the rails, please make a plea for the continuation of the efforts now being made to relieve the track of its unjust burdens by lessening the car weights. The ultimate savings in operating costs of all kinds to be gained by so doing are obvious.

Sept. 22, 1917, Vol. 50, page 496; extract from staff article:

> It can be said, however, that 60-lb. rails, whether in brick, block, concrete or asphalt pavement, have not stood up under the shock of cars weighing 48,000 lb. or more. In fact, track put down in 1911 has already required complete overhauling instead of giving twenty years or more of real service.

Sept. 22, 1917, Vol. 50, page 501; extract from article by J. C. Thirlwall:

> Hence the replacement of the heavier cars with these, even with 50 per cent more units, means a reduction of from 50 per cent to 60 per cent in the weight upon the rails. This will result in economies . . . . in track . . . . maintenance.
>
> . . . . In view of these factors, some competent engineers assert that the maintenance of way and structures would be at least directly proportional to the weight carried over the rails; others say that a reduction of 50 per cent in the weight would result in not more than 25 per cent saving.

Sept. 29, 1917, Vol. 50, page 562; extract from editorial:

> This maintenance saving has been variously estimated to be from 20 per cent to 60 per cent of present maintenance costs. . . . Certainly it will not be necessary to use 129-lb. rail with heavy welded joint construction and 6 in. to 12 in. of concrete underneath the ties where the rolling stock weighs no more than 16,000 lb.

Feb. 4, 1922, Vol. 59, page 195; extract from article by Pierre V. C. See:

> Assuming that rail costs $6,000 per mile and will last ten years under the operation of the 62,000-lb. car, all conditions being equal, the rail on which the 42,000-lb. car is operated should last proportionately longer. Experiments on the strength of steel have proved that steel will break more easily under much fewer heavy blows than a large number of light blows. Upon this basis, our engineering department has figured the saving in the wear and tear of rail alone at approximately $250 per mile, per year.
>
> Concerning ties, the average maximum life of a good grade of tie is approximately nine years. In other words, a tie will decay during that period to a condition where it is of no value. In the running of heavy cars, the rail will wear itself into the tie, thereby considerably shortening the life of the tie as compared to the life of the tie over which the lighter cars are operated. How much this amounts to is difficult to figure accurately, but it is safe to assert that the ties over which lighter cars are run will last at least one year longer. This being true, the average renewal per year under heavy traffic would be 300 ties per mile. Under the lighter traffic it is but 270 ties per mile, making a new annual saving of 30 ties per mile. At an average price of $1.30 each, this amounts to $39 per mile per year.
>
> There is also a considerable saving in the reballasting of roadbed. What this amounts to, so far as our experiments go, is but an estimate, but our engineers are a unit in declaring that the saving is easily 10 per cent per year. Track and roadbed, labor and ballasting material costs have been approximately $750 per mile, and upon that basis the 10 per cent saving amounts to $75 per mile. The apparent saving is, therefore, to be summed up as follows: rail, $250; ties, $39; maintenance of roadbed, $75; total $364 per mile, or more than $6,700 annually for the roadway of the entire line.

Feb. 7, 1914, Vol. 43, page 295; extract from editorial:

> . . . . Just so much extra weight to consume power, to wear out the track, and to make more expensive repairs.

Third Annual Report by Board of Supervising Engineers, Chicago Traction, page 258:

> Weight—In designing electric street railway cars it is of greatest importance to reduce the weight as much as possible consistent with the requisite strength and durability. The most important reasons for this are: . . . . 2. Increased life of track and special work.

It is interesting to note in Mr. Clark's article that track laid previous to 1902, which was removed from ten to twenty years thereafter, showed a decreased length of life; while the track which was laid after 1902 and removed after the same period, of ten to twenty years, showed an increased length of life. It was about 1902 that the weight of cars began to increase, and this increase continued practically until 1912, remaining at a maximum weight until about 1918 when the expense of operating the heavy cars was investigated, with the result that lighter weight cars began to be adopted. This indicates that track structures built for light weight cars would not stand up under the heavy equipment.

In 1909 M. V. Ayres, electrical engineer for the Boston & Worcester Street Railway, read a paper, which appears in the "Proceedings of the American Street Railway Engineering Association" for 1909. He went into the matter very thoroughly, and, speaking of tracks, stated as follows:

> It is evident that a certain part of the cost of track repairs would be incurred irrespective of use, as decay of ties and corrosion of metals, and injury from teaming would go on just the same. Otherwise, wear is evidently about proportional to ton-mileage. If track construction is much too light for the car weight, doubtless the wear would increase faster than the weight, but with tracks suitable to the traffic, it is probably closely proportional.

This subject is a very pertinent one at the present time, and the track engineers would be of great assistance to the industry by giving instances of their actual experience in connection with the wear of not only the rail head but the entire track structure, and the effect of different weights of equipment. It would seem that the present time is a proper one for data based on fact to be presented, as heretofore articles on this subject have stated opinions more than facts.

In order that the data may be useful to the industry at large, it will be necessary for contributors to state the general conditions surrounding each case. These conditions comprise operating speeds, weight and design of cars, traffic density, number and position of stops, use of brakes, grades and curvature, vehicular traffic and type, design of rails and car wheels, maintenance, and finally, composition and section of rail with type of track construction.

W. R. DUNHAM,
Executive Engineer.

Vocational Training at Nashville

For the Past Two Years Classes Have Been Held for Benefit of Local Electric Railway Men—Results Justify Continuance of Educational Efforts

THE Nashville Railway & Light Company has made an active start along vocational educational lines during the past two seasons. Preparatory to this work the company sent J. J. Connors, carhouse foreman, to a summer school at Minneapolis, Minn., conducted under the auspices of the Federal Board of Vocational Education. This school or conference was conducted by C. R. Allen and J. C. Wright, of the federal board. It was attended by 150 or more foremen, state representatives of the board, college teachers and others.

The conference continued thirty days, and those who completed its curriculum were given certificates stating their competency to lead foremen training classes. The Nashville company representative received one of these certificates. He also attended later a local class organized under the state vocational board and received a certificate for this work also.

During the winter of 1921 and 1922 there was conducted for the company a foreman conference under the auspices of the federal board through the state agent, James Arensten. Mr. Connors and Mr. Arensten conducted the classes. The program of the conference consisted in what is known as "job analysis," that is, study of the characteristics of different kinds of jobs, which forms so important an element in modern industry.

This conference included the foremen of the machine shop, "riptrack," wood shop, paint shop, armature room, carhouse and track, the overhead lineman, the powerhouse foreman, the superintendent of schedules, the safety director and the division superintendents. The registration was about twenty-five, and the average attendance, fourteen. The company gave a supper each week in its own restaurant to encourage attendance at the conference. The conference continued for six months, sessions being held on Monday evenings from seven to nine. There was no charge for this instruction.

Since the conference disbanded over a year ago, the results have been evident throughout all departments of the company, the foremen being able to pass over to the subordinates the lessons which they learned.

THE SECOND SEASON'S EDUCATIONAL PLAN

The next step in the educational program was the inauguration during the season of 1922-1923 of a course in electricity under the auspices of the federal board, but for convenience the sessions were held at the Watkin Institute in Nashville. The registration was twenty-two, and the average attendance eleven. This class continued from Dec. 19, 1922, to May 15, 1923, meetings being held twice each week, a total of four hours per week. Timbie's "Elements of Electricity" was the textbook used and it was about one-half completed. It is expected that the book will be completed during the coming season.

For this class a graduate electrical engineer was secured as instructor. He took up every-day problems, especially those that arise in the shops in which the members of the class were employed. There was no lecturing and the men were encouraged to discuss the subject, freely.

Lessons were assigned in advance, together with problems, the solutions of which were to be put on the blackboard before the class. No fee was charged for this instruction, as during the preceding season. As the class was not held in the company's quarters, it was impracticable to continue to furnish supper.

The management of the Nashville property is enthusiastic regarding the possibilities of this kind of training, and what has been done during the past two seasons can be considered merely a beginning.

Traffic Doubled on Recent Extension

IN THE first five months of operation the passenger traffic on the Westminster extension of the Buffalo & Lake Erie Traction Company has about doubled. Prior to Nov. 26, 1922, when the company extended its West Twenty-sixth Street line from the old city limits of Erie to a point 3½ miles farther west, service to this section had been given by the Cleveland & Erie Electric Railway. The latter company suspended operation in the early summer of 1922 and for several months this section had no railway service at all.

People having business in Erie experienced great difficulty in getting back and forth from their homes, and the Buffalo & Lake Erie Traction Company was finally persuaded to purchase and operate part of the abandoned line. Instead of the former hourly service with big two-man interurban cars, thirty-minute service is now provided with smaller double-truck one-man cars. Two fares are charged, one to the old city line and a second fare from there to Westminster.

The people of the district are very much pleased with the service and even go so far as to decline offered automobile rides to town lest the railway become discouraged by losing some business. Much new home building is in progress along the route of this extension and railway traffic promises to become increasingly profitable.

Association News & Discussions

Program Wisconsin Meeting

THE electric railway section of the Wisconsin Utilities Association will meet on Aug. 16 and 17 at Oshkosh, Wis., as previously announced in these pages. The program follows:

Thursday Morning

Address by Chairman B. W. Arnold, "Progress and Problems of Urban and Interurban Transportation in Wisconsin."

Address by Commissioner Andrew MacDonald, "What the Railroad Commission Expects of Operating Men."

Paper on "Urban and Interurban Track Problems" will be discussed by A. A. Oldfield, Eastern Wisconsin Electric Company; J. S. Hyatt, Chicago, North Shore & Milwaukee Railroad, and John St. John, Milwaukee Northern Railway.

Paper by W. G. Brooks, Westinghouse Electric & Manufacturing Company, "A Salesman's View of the Master Mechanic's Problems."

Address by Prof. James T. Rood, "What the University of Wisconsin Is Doing and Can Do for the Electric Railway Industry."

Luncheon at the Municipal Club.

Thursday Afternoon

An inspection trip to the new Oshkosh carhouse. Track under construction will be inspected en route. Inspection of new one-man interurban cars and de luxe coaches.

Demonstration by the Chicago Elevated first-aid team.

Baseball game, "Commercial Ambassadors" vs. "Transportation Dispensers."

Banquet at 6:30 with Prof. C. F. Hewitt, Oshkosh Normal College, as toastmaster, and an address on safety by Charles B. Scott, Safety Bureau, Chicago.

Dancing at 9:30 at Eweco Park.

Friday Morning

"The American Electric Railway Association and Its Services to the Electric Railways of Wisconsin," by James W. Welsh, executive secretary.

"Maintenance of Motor Vehicles," by Henry Cardell, Chicago, North Shore & Milwaukee Railroad.

"Bus and Coach Tires," by Howard Smith, sales manager General Tire Company, Akron, Ohio.

"Street and Interurban Transportation Problems," by Carl Allen, Wisconsin Public Service Corporation.

Friday Afternoon

Arrangements have been made for playing golf for those interested.

A program of entertainment for the ladies has been arranged for the convention, including shopping, bathing and boating, motoring, bridge and five hundred parties on the veranda at the Municipal Club, etc.

Mid-West Claim Agents' Association

THE third annual convention of the Mid-West Claim Agents' Association in Denver, recently concluded with the election of Travor C. Neilson, claim agent of the East St. Louis & Suburban Railway, and related companies, as president. In this capacity he will succeed W. C. Swisher, general claims attorney of the Kansas City Railways, Kansas City, Mo., who was elected at the convention held last year in St. Louis.

The other officers chosen were: S. G. Shaw, claim agent of the Denver Tramway, first vice-president; D. M. Finch, claim agent of the Des Moines City Railway, second vice-president; Charles B. Hardin, claim agent of the United Railways, St. Louis, executive committeeman at large; O. L. Borquist, chief clerk of the legal department of Kansas City Railways, secretary.

Training Oxy-Acetylene Welders

THE American Welding Society has just issued an outline of a course for the training of oxy-acetylene welders. This report was prepared by a committee and combines the experience of experts of the Federal Board of Vocational Education, the American Welding Society and the National Research Council for the information of the person who is selecting condidates, the text includes a discussion of the qualifications which the candidates for training should possess. For the information of the instructor, the text includes the fundamentals in gas welding, together with a detailed statement of content, classified under type welding jobs arranged in the order of difficulty. Copies may be secured from the American Welding Society, New York, N. Y.

Canadian Association's Secretary

EUSTACE SMITH, JR., who is executive assistant, Toronto Transportation Commission, has been appointed secretary of the Canadian Electric Railway Association, by H. H. Couzens, the new president.

A.E.S.C. Activities

THE American Engineering Standards Committee has taken under consideration for adoption as "American Standards" a number of new specifications proposed by the various technical societies. The principal ones of interest to the electric railway industry are those for line materials. The test methods for concrete materials, are approved as tentative standards.

The American Electric Railway Association has submitted its specifications for overhead line material for action by the A.E.S.C. A special committee to consider the question of sponsorship and scope of the specifications, which are also of direct interest to other than electric railway interests, is headed by A. H. Moore, representing the Electrical Manufacturers' Council on the A.E.S.C., and includes representation from the National Electric Light Association, American Railway Association, Electrical Manufacturers Council, American Institute of Electrical Engineers, American Electric Railway Association, American Short Line Railway Association, and the Bell Telephone System.

The attitude of the A.E.R.A., in submitting its specifications for this action by the A.E.S.C., will definitely favor the unification and elimination of conflicting specifications in this field, which is a very important one to a large group of industries, and involves expenditures of great magnitude annually in construction, maintenance and replacement of power, light, telephone, telegraph, and railway signal lines.

The following A.S.T.M., methods of testing materials entering into concrete have been approved as "Tentative American Standards" by the A.E.S.C.: Method of test for unit weight of aggregate for concrete; method of test for voids in fine aggregate for concrete; method of test for organic impurities in sands for concrete.

American Association News

Large Exhibit at Atlantic City Assured

PRACTICALLY all the space at present available for exhibits on the Million Dollar Pier in Atlantic City has been sold for the October convention of the American Electric Railway Association, and the exhibit committee is considering now with the pier authorities whether some arrangements cannot be made for additional room suitable for exhibits. The area sold up to Aug. 7 was 64,328 sq.ft. This includes all portions of the pier usually used for exhibits except some space in Aquarium Court which is being held for noisy exhibits or those which have some fire risk.

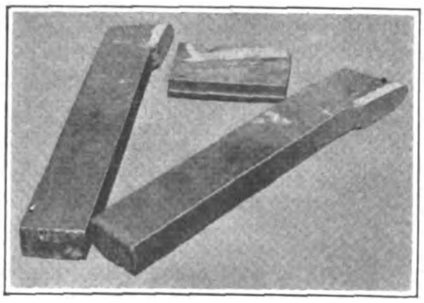
A list follows of the manufacturers to whom space has been allotted since the publication of the original applications on page 25 of the issue of July 7.

	Space
Albert & J. M. Anderson Manufacturing Company	28
American Car & Foundry Co.	410
American Steel & Wire Co.	551-553
Aluminum Company of America	308
Air Reduction Sales Company	200A
The Cleveland Fare Box Co.	402
Differential Steel Car Company	583
Federal Motor Truck Company	154-164 incl.
Gould Coupler Company	584-585
W. S. Goodwin Company	114
Hoover Body Company	303-305
Hubbard & Company	412
International Register Co	537-539
Mack-International Motor Truck Company	301
Morganite Brush Company	535
Portland Cement Association	129
Rubberset Company	127
Standard-Johnson Company	622
Templeton, Kenly & Co., Inc.	582
Union Switch & Signal Co.	131
Van Dorn Coupler Company	404
Witherow Steel Company	109
Yellow Coach Manufacturing Company	313-315 317-319

Maintenance of Equipment

Tipping Tool Proves Economical

THE Lehigh Valley Transit Company, Allentown, Pa., has been welding tool steel tips on the larger sizes of cutting tools used in its machine shops. A common quality of bar steel is used for the shank. This bottom part is cut so as to provide a shoulder at the back of the tool steel tip to take the strain from the machining operation. Both the bottom and the tip are scarfed along the edges where they join and to provide for welding the tool steel tips to the bottom. This practice reduces the amount of tool steel required and some very satisfactory results are being obtained. Tools used in the turning of wheels last for turning from eighteen to twenty-two pairs of wheels with one grinding. An accompanying illustration shows several tools that have been tipped in this manner.

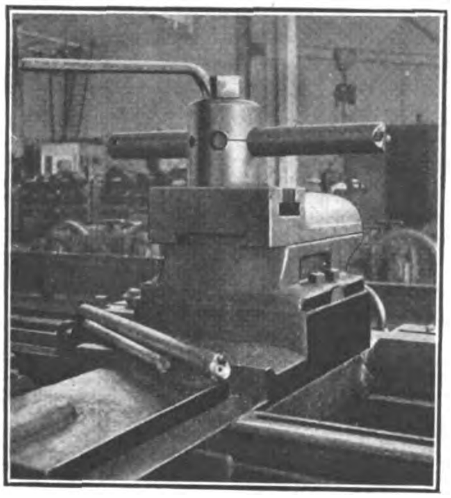


Tool Steel Tips Welded to Bar Steel Shanks

An Adjustable Boring-Bar Holder

AMONG the various devices which are in use in electric railway shops for holding a boring bar on a lathe carriage, the adjustable type shown in the accompanying illustrations is one of the most convenient. These illustrations were made from photographs taken in the machine shop of the Virginia Railway & Power Company at Norfolk.

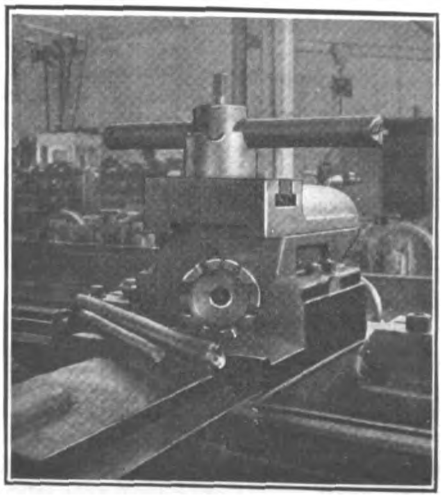
The body of the holder is cylindrical. A projection at the bottom has a head to fit in the T-slot of the lathe carriage, and an extension at the top is threaded to take a standard nut. A transverse hole drilled through the center is of sufficient diameter to clear the largest-sized boring bar.



Boring Bars Can Be Quickly Changed or Adjusted by Means of This Three-Part Tool Post

Surrounding the body of the holder is a steel sleeve of such a length that when the bottom rests on the carriage the top comes to the middle of the hole in the body. This is machined to accommodate several sizes of boring bars, three in the case shown. Over the top of the body fits a cap bored out to match the sleeve. When this is drawn down by means of a nut, it clamps the bar securely in position and clamps the holder to the lathe carriage.

The illustrations show the three boring bars which go with the holder, one in position, the others lying on the base of the carriage.



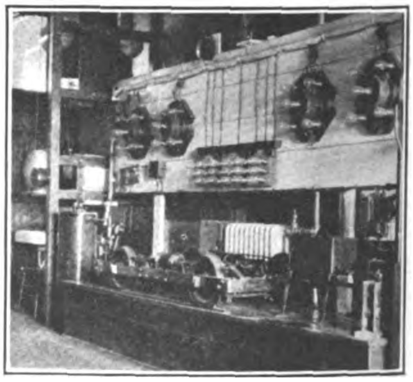
The Clamping of the Boring Bar Is Rigid and Simple

Grease Keeps Water Out of Track Switches

THE East Massachusetts Street Railway is using motor grease in its boxes of spring track switches. It is found that this keeps the water out and the parts in good condition. A light grease, somewhat similar to that which would be employed in the differential box of an automobile, is used.

Repair Shop Builds Model Truck

A SHORT time ago the repair shop of the Connecticut Company at Hartford built for instruction purposes a truck about one-third standard size. This truck was provided with airbrake equipment complete and then placed in the instruction room for motormen in the State Street carhouse in Hartford. It now forms part of the instruction equipment there.



Model Board and Truck in Hartford School Room

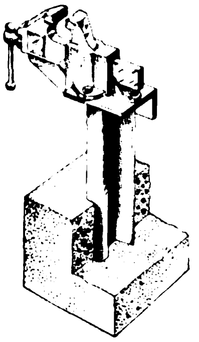
As illustrated, the motor electrical circuits are shown on the board in the upper part of the exhibit. Each of the four motors of a car equipment is represented by a model in relief of a motor, with armature and four field coils, each with a lamp, and a series of grid resistances. As the controller is turned, the separate lamps light up to show the connections. Above the board is a trolley by which power is taken from the overhead wire. The model also has a circuit breaker, air switch and door control.

Below on the platform is the

truck built in the Hartford repair shop. It is equipped with air brakes, controlled by an engineer's valve. Similar models are to be installed at the New Haven and Bridgeport instruction rooms.

Pedestal Vises Facilitate Repair Work

MUCH effort is wasted in the average repair shop in carrying work to and from the bench so that it may be held in the vise for various fitting operations. The West Penn Railways, Connellsville, Pa., has found it desirable to handle such work close to the job, either in the blacksmith or machine shop. For this purpose three vises have been installed at different points in the shop. These are standard machinists' vises with 8½-in. jaws, having a maximum opening of 12 in. Each of these vises is installed on an independent pedestal, made of old rail, which is set vertically into the ground, being sunk about 3 ft. beneath the floor. The rail is incased in concrete, making a very solid structure. The vises are about 3 ft. above the floor level of the shop. Being entirely separate from any work benches, these vises can be approached from any side, so that there is great freedom afforded the workman in handling parts in them. Their use has proved beneficial, has saved time on many jobs, especially those of fitting parts for truck work, and similar repair work.



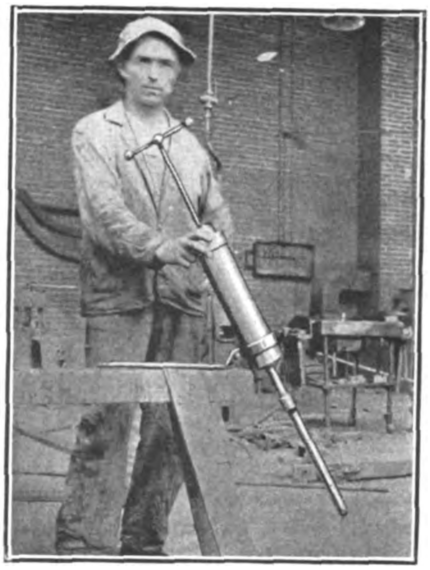
The Vise Is Mounted on a Rail Imbedded in Concrete

Grease Gun Minimizes Waste of Lubricant

A CAPACIOUS and cleanly grease gun, made in the local shops, is used by the Newport News & Hampton Railway, Gas & Electric Company, in applying heavy grease. This consists of a tube about 3½ in. in diameter and 15 in. long, with an equal length of ¾-in. pipe projecting from the lower end.

The upper end is surmounted by a cap and nut through which travels a long threaded rod with an 8-in. crossbar at the top. A leather-packed piston is attached to the lower end of the rod. The piston rod is threaded eight threads to the inch, and a few turns suffice to inject a liberal supply of grease. The whole thing is under perfect control.

This gun enables grease to be placed in any location and is particularly effective in reaching inaccessible places which are frequently either over or under lubricated. A foot made of strap steel is attached to the cylinder to support the weight of the gun when it can be used in the position shown in the illustration.



A Practical Grease Gun Made at Hampton

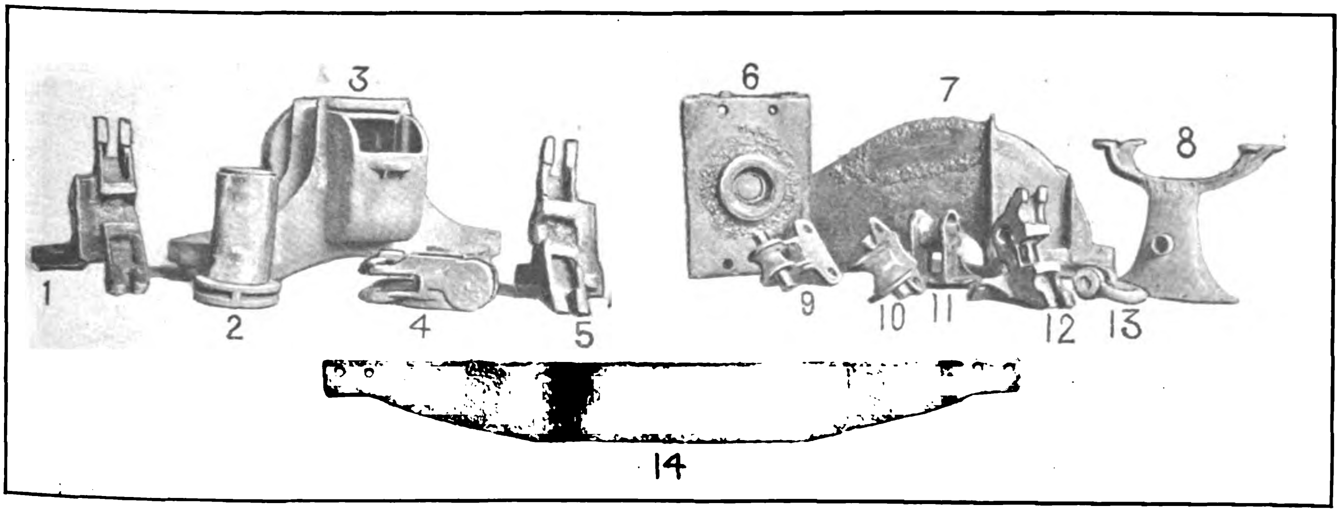
Typical Welding Reclamation Jobs

Illustrations Are Given of the Uses of Acetylene and Electric Welding—Savings Have Amounted to as High as $7,500 in a Single Month

IN THE SHOPS of the Nashville Railway & Light Company, of which George Swint is master mechanic, the use of electricity and acetylene in welding is highly developed. A number of the most successful jobs have been selected for illustration, particularly to show the reclamation of truck parts.

Reclamation plays such an important part of the shop activities at Nashville that in a single month as high as $7,500 worth of parts has been reclaimed. In the accompanying reproductions of photographs, taken recently in the Nashville shops, the several parts are numbered for identification. The salient facts regarding each of these jobs are as follows:

The pair of brakeheads for the driving wheels of the Brill 39-E



Samples of Reclamation Work on Truck and Other Car Parts Done in Shops of Nashville Railway & Light Company

Nos. 1, 5, 12. Brakeheads for Brill 39-E trucks.
No. 2. Bearing for GE-90 motor.
No. 3. Journal box for Brill 21-E truck.
No. 4. Brakebeam fulcrum.
No. 6. Center plate for Brill 39-E truck.
No. 7. Gear case for GE-57 motor.
No. 8. Pressed steel seat stand.
Nos. 9, 10, 11. Carriers for half-ball brake-hangers.
No. 13. Brake-rod clevis.
No. 14. Brake beam.

truck, Nos. 1 and 5 in the illustration, were welded on the toes and filled on the lute with an acetylene torch. The same is true of the brakehead for the pony wheels of the same truck, No. 12. Another acetylene job, No. 2, was on the bearing for the GE-90 motor. Here the dowel pin holes were filled in so that the bearing could be redoweled.

The journal box for the Brill 21-E truck, No. 3, was cracked at the junction of the arm and the journal box proper. It was welded as shown by means of the electric arc. Another electric welding job, No. 4, was the brakebeam fulcrum, the holes in which were filled in ready for reboring. The truck center plates, No. 6, had the wearing surface on the plates completely renewed by the use of acetylene. The malleable-iron gear case for the GE-57 motor, No. 7, was also repaired by means of acetylene welding, a patch of sheet iron being welded over a large break in the case. Still another acetylene job is the sheet steel seat stand, No. 8. The upper part of this stand was completely broken off, but was replaced and welded into position as good as new. The pressed steel was, of course, too thin for the use of the electric arc.

A group of jobs of particular interest are illustrated in Nos. 9, 10 and 11. These are brake-hanger carriers in which the seats for the half-ball hangers have become worn. The seats are not built up and resurfaced to a spherical curvature, but instead a bushing or spindle, a piece of heavy steel tubing, was welded into place with the acetylene torch in each case. When the truck parts are reassembled, the weight of the hanger is carried on the spindle instead of the original surface.

Two more electric welding jobs remain to be mentioned. One is the brake-rod clevis, in which the metal worn away by friction was replaced, with a little extra for good measure. The other is the brake beam or bar, No. 14, which had begun to crack at the inside bends. The cracks were filled in with new metal and a reinforcing layer was spread out generously in all directions from the cracks.

The illustrations which are typical of all of the work done in the reclamation department bring out the fact that the gas welding is used wherever the metal is thin, and for cast iron, brass, copper and aluminum. The electric welder is used for everything else.

Device for Lighting Acetylene Torch

IN THE shops of the Kentucky Traction & Terminal Company, Lexington, Ky., a handy gas lighter has been made to permit gas to be lighted by means of a short arc drawn between two small carbons. The carbons are mounted in clamps at the end of a pair of brass springs anchored on a tapered block of fiber. The carbons are about ¼ in. in diameter and an inch long, and they are held in place by friction. The device is attached to a lamp cord leading from the negative side of a 500-volt lamp circuit to hold the current down to a small value. The springs and handle are wrapped with adhesive tape.

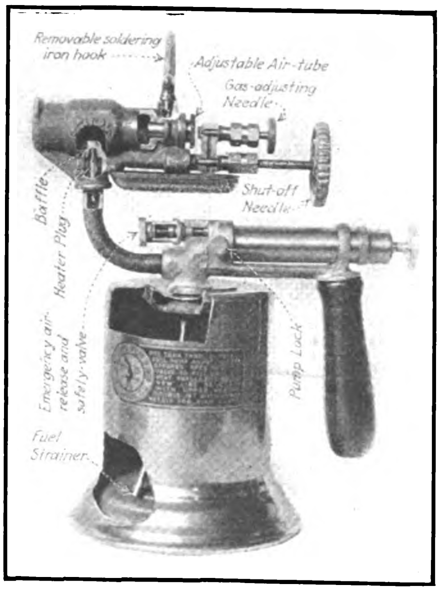
A Safe Lighter for Gas Torches

The lighter is about 8 in. in length, and about 2 in. wide when the carbons are held in contact.

New Equipment Available

New Features in Blow Torch

A BLOW TORCH with a number of new and useful features is now being marketed by the Turner Brass Works, Sycamore, Ill. The fuel tank is arranged with but one opening which is on top. This eliminates the possibilities of leaks from soldered connections and eliminates the hazard from fires, explosions, etc. A safety valve located at the end of the horizontal pump cylinder is fitted with a diaphragm which automatically opens and closes at 40-lb. pressure. As blow torches operate ordinarily at from 18 to 20-lb. pressure, this safety valve does not come into action until about double the normal pressure is obtained and the maximum limit of the safety valve is still well within safety.



Sectional View of Improvement in Blow Torch

An air release in combination with the safety valve is provided, which when opened after the operator has finished using the torch releases all pressure in the tank as an additional safety precaution. The pump is equipped with a leather that spreads like a parachute on the work stroke and closes on the return stroke. This leather is automatically lubricated from a reservoir containing vaseline.

In going from the tank to the combustion chamber, the fuel passes through the interior of a solid bronze baffle. The baffle is the obstruction in the burner on which the flame is constantly applied. Heating the fuel to a hot dry gas insures perfect vaporization of the gasoline or kerosene, thus generating more heat with lower fuel consumption, and without the danger of clogging.

The maximum admixture and combustion of oxygen is obtained by admitting air through a flared inlet in front of the needle valve instead of depending upon a multitude of holes in the burner tube. This inlet is a bell-shaped nut turned from brass stock an threaded so that the operator can screw it into or out of the tube, thus regulating the distance from the needle valve and consequently the volume of air admitted. The shut-off valve used to shut off the flame is a separate unit from the adjusting needle or orifice needle.

Another improvement consists in the provision of a pistol-grip handle. Special attention has been given to providing room for a large sized hand so that the torch can be handled without danger of tiring the user and without obstructing brackets.

The News of the Industry

Union Depot Proposed

St. Louis Engineer Wants East St. Louis Line to Have St. Louis Terminal for Fifty Cars

The engineers committee of the St. Louis-East St. Louis Railroad terminals, 1922, has reported on the question of the operation of cars of the East St. Louis & Suburban Railway over the Eads Bridge into St. Louis. The committee believes that appropriate steps should be taken by the company to accomplish:

1. The abandonment of the Eads Bridge for railroad traffic.
2. The use of the upper roadway for highway traffic free from toll.
3. The use of the present railroad tracks on the lower level for electric street and interurban cars.

The East St. Louis & Suburban Railway operates a very heavy electric car traffic over this bridge to and from a stub end station with two tracks at the west end of the bridge at Third Street and Washington Avenue, St. Louis. Its tracks occupy the same roadway as other highway traffic.

The suggestion has been made that tolls be removed from the bridge, in which event the engineers regard it as practically necessary to remove the electric cars from the upper deck and put them on the railroad deck. This they say, would not only largely increase the capacity of the highway roadway for handling traffic, but would also expedite the passage of electric cars and interurban cars across the river. These cars handle, in round numbers, 10,000,000 to 12,000,000 passengers per annum, who get on and off the cars at the west end of the bridge.

On account of the interference with St. Louis street cars and other surface traffic in the vicinity of Third Street and Washington Avenue it has not been considered feasible to have the East St. Louis street and interurban cars extend into St. Louis. They cannot operate on St. Louis street car tracks on account of different gages. As the engineers see it if the cars be placed on the lower deck of the Eads Bridge, their operation can be extended further west underground as far as may appear desirable. They suggest as an excellent site for a terminal for these lines the "Market Block," owned by the city of St. Louis, bounded by Broadway, Lucas Avenue, Sixth Street and Morgan Street, three blocks west and one block north of the present end of the Eads Bridge electric car tracks.

Such a plan would necessitate removing all railroad passenger and freight trains from the Eads Bridge and tunnel.

Charles S. Betts, engineer of the Department of Public Utilities of St. Louis, in his comments and recommendations to the committee says in part:

> The logical solution for an Interurban Station would be to leave the present railway tracks on the lower deck of the Eads Bridge at about the alley east of Second Street then southwest to Third Street landing at Third Street and Washington Avenue with about nine tracks as per present plans with 20 ft. track centers, or 12 ft. between cars which serve as loading and unloading platforms, each line having its separate track to come in on and depart on.
>
> In other words, we would have our Union Station duplicated for electric interurban cars. This arrangement would cause no confusion as every track is numbered. The advantage of this station would be that it is all above ground. The interurban cars are double ended and for this reason can use this proposed station without change of car equipment.
>
> Another use to which this station might be put would be for a garage on the second floor with entrance on Eads Bridge adapted for East side autos.
>
> The proposed station is contingent on the lower or railroad deck being turned over to the interurban roads and the use of the Municipal Bridge by the steam railways now using the Eads Bridge.

The plan of the proposed interurban station with track arrangements for fifty cars and a storage of twenty cars was submitted by Mr. Betts.

Interurban Lines Will Construct Freight Terminal

Plans of the interurban railways entering Indianapolis to construct a new freight terminal on Kentucky Avenue, where the freight depot of the Terre Haute, Indianapolis & Eastern Traction Company is now located, were recently approved by the Public Service Commission. As a result of the action of the commission, Indianapolis will have adequate interurban freight terminal facilities.

The order of the commission releases the Indianapolis Street Railway from the obligation of providing the freight terminals and leaves the interurban lines free to construct an adequate freight depot.

The plans call for the construction of an addition to the present freight house of the Terre Haute, Indianapolis & Eastern, and for the construction of a large new freight terminal. It is hoped to have sufficient additional facilities provided by Dec. 31, to take care of the freight of the Indianapolis & Cincinnati Traction Company and the Interstate Public Service Company. Construction of the new terminal is to be financed by the formation of the Terminal Realty Company, which will acquire additional ground at the Kentucky Avenue site. The company was authorized to issue $1,500,000 of preferred stock, to be sold at $96.10, and $750,000 of common stock to be held by the interurban companies.

Wage Offer Accepted

Montreal Trainmen Will Continue for Another Year at Present Pay—Adjustment for Shop Men

Of 2,088 union tramway men who cast ballots on July 31 in the referendum held by the Montreal Tramways Union, 1,211 members, or more than half of the entire number, voted to accept the offer of the Montreal Tramways and settle the wage dispute in that way.

The result of the referendum vote on the matter was as follows:

To accept the offer of the company, 1,211 votes.

To refer the wage dispute question to a board of arbitration, 195 votes.

Willingness to strike within forty-eight hours from the taking of the ballot, 661 votes.

Spoiled votes, 21.

Total number of votes cast, 2,088.

The offer of the company, which the men by a majority vote have decided to take, is to sign a contract with the employees for one year dating from July 1, 1923, at present rates, with certain readjustments in the company shops and outside departments. On the understanding that this offer is accepted, the company further promises to give consideration to the establishment of a pension fund for all the employees as soon as all the obligations under the contract with the city of Montreal are fulfilled.

REDUCTION IN DAY ASKED

Motormen and conductors are now paid in most instances at the rate of 48 cents an hour, for a ten-hour day, time and a half being paid after that number of hours have been worked. The original demands of the union were for an eight-hour day, with the same pay as at present being received for the present longer work day.

The company declined to consider any advance in wages paid to motormen and conductors affirming that the wages of their employees have been increased 100 per cent since 1913, and are now 65 per cent higher than they were in 1918, while the cost of living for a family of five, according to the figures of the Department of Labor, was only 6.52 per cent higher than in April, 1918.

Decision to hold a referendum among the membership of the union was reached at a meeting on July 23, as the negotiating committee could see nothing resulting from further parleys with the company officials, and they wanted an expression of opinion from the men in order that the future policy of the union in this matter might conform to the wishes of the majority of the union members.

Interurban Asks Franchise

Ordinance for Entrance Into Cincinnati Provides for Right of City to Control Service and Fares

The Cincinnati, Lawrenceburg & Aurora Electric Street Railroad, through its attorney, Stanley Shaffer, has made application to the City Council of Cincinnati for a franchise to bring its tracks from Anderson's Ferry into the heart of Cincinnati. This is the most important step taken by the interurban company to enter Cincinnati over an elevated structure. The interurban company plans to make its Cincinnati terminus on Third Street near the Dixie Terminal, the northern terminus of the South Covington & Newport Street Railway. According to Mr. Shaffer, most of the new route, which is more than 7 miles in length, will be made over private right-of-way, nearly all of which already is held under option. The estimated cost of the extension is about $800,000. At the present time, residents of towns along the route are brought from their homes to Anderson's Ferry. Here they are compelled to board cars of the Cincinnati Traction Company to convey them to Cincinnati.

SERVICE-AT-COST FEATURES

The interurban company always was willing to make the extension, but it was impossible until the Ohio Senate repealed the Schmidlapp law, which provided that only a 5-cent fare could be charged on an elevated railway. On the basis of a 5-cent fare, it was impossible to make the extension. Last March the State Senate passed the Lipp bill, which gives City Councils power to fix rates of fares on elevated railroads in excess of 5 cents.

Under the terms of the ordinance, the city has control of the service, has the right to fix schedules and designate the number, type and design of cars to be operated. All rates, fares and charges of the interurban company are to be based upon the cost of service. A feature of the measure is the establishment of a "fare index fund" to take care of surplus gross receipts remaining after deducting depreciation and taxes, also interest on the bonds which will be used to build the extension. Upon commencement of the service the ordinance provides the company shall deposit to the credit of the fund $10,000. The ordinance specifies that when the fund exceeds $20,000 it shall be conclusive evidence that the rate of fare is too high or the service insufficient and therefore the rate of fare should be reduced or the service increased, as shall be mutually agreed upon between the city and the operating company. When the amount credited to the fund falls below $5,000 then it shall be evidence sufficient to prove that the rate of fare is too low and therefore the rate shall be increased or the service diminished. The rate of fare will be 10 cents between Cincinnati and Anderson's Ferry.

Mr. Shaffer said that Edgar Stark and C. E. Hooven, receivers for ten years of the interurban company, now have the system on a paying basis and soon will make their final report and be discharged. With the discharge of the receivers a new company to be known as the West End Terminal Railway, which was incorporated last fall with a capital of $10,000, will organize and take over the operation of the extension. This company also will issue bonds for the improvement.

Incorporators of the new company are: H. Lee Early, L. B. Patterson, Morgan Wamsley, and Dr. John Walton. These men are residents of towns along the route of the Cincinnati, Lawrenceburg & Aurora Electric Street Railway.

APPLICATION BEFORE COUNCIL

The application for a franchise has been referred to the Council committee of street railways for public hearings.

With the completion of the extension the length of the interurban line will be 40 miles.

Electric Railroad Between Los Angeles and San Francisco Contemplated

Recently the Santa Fe Railway system announced publicly that an appropriation was available to the amount of approximately $132,000 for conducting a complete survey for the construction of a new line between Los Angeles and San Francisco.

At the time of the survey considerable thought was to be devoted as to the most economical and feasible type of motive power to adopt. The Santa Fe's present connection for its steam road line on the Pacific Coast between Los Angeles and San Francisco is via its own line from Los Angeles to Bakersfield, thence from Bakersfield to San Francisco over the Southern Pacific Lines.

The Santa Fe system now has a budget for a $30,000,000 improvement program on the Pacific Coast, which involves double-tracking of several of its lines and the construction of several extensions. The proposed new line between Los Angeles and San Francisco will involve the greater portion of the budgeted amount, the estimated expense being about $25,000,000.

The line as proposed will be the shortest direct rail communication between the two largest cities of the state of California. At least 30 miles will be reduced from what is now the shortest rail route. The construction of the new line awaits the approval of President Story of the Santa Fe before actual work is undertaken. The surveyed route is stated to run from San Francisco to Bakersfield, thence south and west by the lines of least geographical resistance to the Tehachapi mountain range, thence by a system of many large and long tunnels into Los Angeles almost on a direct line.

It is stated that electricity for motive power will establish a precedent in extension work on an immense scale for the Santa Fe lines.

Six Per Cent Increase

Board Refuses to Grant Pay to Eastern Massachusetts Men Equal to Scale Paid on Boston "L"

A special board of arbitration has awarded an increase in wages to the employees of the Eastern Massachusetts Street Railway equivalent to about 6 per cent, or 3½ cents an hour. This award was announced in the ELECTRIC RAILWAY JOURNAL, issue of Aug. 4. The arbitrator for the men, James H. Vahey, dissented from the majority award, claiming that it was insufficient. Henry C. Attwill, chairman of the board, who is also chairman of the Massachusetts Public Utilities Department, announced the following new wage scale:

MOTORMEN AND CONDUCTORS	Cents an Hour
First three months	52½
Next nine months	55½
Over one year	58
One-man car differential	5
TRANSPORTATION DEPARTMENT	
Crossing tenders	54½
General helpers	54½
LINE DEPARTMENT	
Linemen	62½
" helpers	55½
STORES DEPARTMENT	
Helpers	54½
POWER PLANT	
Asst. eng.	70
Firemen	61½
Foremen of helpers	61½
Firemen helpers	58
General helpers	55½
Oilers	58
Pipe coverers	61½
Repairmen	59½
Substation operators	58
Switchboard operators	60½
Hoist. eng.	63

ROADWAY DEPARTMENT	Cents an Hour
Trackmen	54½
REPAIR SHOP AND ROLLING STOCK	
Blacksmiths	58
" helpers	54½
Babbiters	56
Carpenters	58
" helpers	54½
Car cleaners	54½
Firemen	58
Machinists	58
" helpers	54½
Painters	58
Pattern makers	58
Pitmen	57
" helpers	54½
Upholsterers	57
Watchmen	54½
Winders	59
" helpers	54½
Wiremen	58
" helpers	54½
Letterers	59½
Truckmen	59
" helpers	54½
Pipers	58
" helpers	54½
General helpers	54½
Electricians	58

In refusing to adopt the suggestion of the employees that their pay should be placed on an equality with employees of the Boston Elevated Railway, Mr. Attwill says:

> In the instance of the Boston Elevated Railway the Commonwealth took over the management and operation of the property of the street railway company and guaranteed to the stockholders of the company the payment of dividends at a rate fixed in the act, while in the instance of the Eastern Massachusetts Street Railway the Commonwealth guaranteed nothing except the payment of certain serial bonds which might be issued by the trustees, which in no event were to exceed in the aggregate $5,000,000.
>
> Undoubtedly the fact that the treasury of the Commonwealth stands behind the financial integrity of the Boston Elevated Railway and not behind that of the Eastern Massachusetts Street Railway is reflected in the difference in compensation heretofore paid to their employees.
>
> In the one instance, if the compensation were made higher than the traffic would bear the deficit would be made up by taxes assessed in the communities in which the company operates, while in the other, if long-continued, a deficit would result in the company ceasing to operate.
>
> Again, the Boston Elevated Railway is less likely to be affected by the competition of motor vehicles. Its gross revenue since its operation by the public trustees has steadily increased.
>
> The gross annual revenue of the Eastern Massachusetts Street Railway has steadily decreased, rather than increased.
>
> It is urged by the employees that no consideration should be given to the interests of the stockholders in the fixation of wages. Assuming this to be true, we must

> give consideration to the credit of the company, as no public utility can hope long to succeed and furnish the service required for the public unless it is able to secure new capital to meet its capital expenditures. Such new capital cannot be obtained unless the conditions are such as to attract it.
>
> Notwithstanding the desirability of making the service-at-cost plan a success, the public ought not, in my judgment, to expect to enjoy the transportation furnished by the Eastern Massachusetts Street Railway as at present organized unless it is willing to contribute in fare sufficient to pay the men who operate the transportation system a wage which is fairly comparable with the wage paid by other utilities furnishing a like service under similar conditions, particularly when there is no indication that such wage is likely to be reduced in the near future.

He referred to the necessity for the company, in order to exist, to change its system into a one-man car system. Further, that by this change the company had been able to show extraordinary improvement in its financial condition and that the situation was now very promising providing the company received the co-operation of the men and that competition by motor buses was eliminated.

Mr. Vahey in disagreeing from the majority award said that he believed that most of the reasoning was faulty and also that the increase granted was insufficient even from the point of view adopted by the majority of the board. He said that he disagreed in particular with the attitude of the majority in regard to the importance of financial questions in a wage determination. That these employees entered the railway service to perform certain specified duties. That they were not consulted about any of the numerous problems of construction and investment and that they must not be forced to take upon their shoulders any of the burdens created by unwise or unfortunate decisions of the present or past managements.

The "Co-operator" Offers Helpful Suggestions

The Department of Street Railways, city of Detroit, is publishing monthly for its employees the "Co-operator," to develop a personal relation between the officials and their subordinates, as well as between the employees in the different divisions of the department. Mayor Doremus in congratulating the editors of the "Co-operator" says that each person should be encouraged to do his best and that faithful or meritorious service should be rewarded by a word or two of appreciation. He said that the pamphlets should prove invaluable in bringing about a closer spirit of co-operation among the many employees.

Number 3 of Vol. 1 contains an instructive article entitled "Co-operative Carefulness," by H. B. Selden, claims attorney. Mr. Selden remarks in his article that during the month of June the Department of Street Railways had 2,080 accidents, the majority of which were due to heedless and irresponsible automobile drivers. He adds that absolute safety can be obtained only by the personal co-operation of every individual in the community.

This particular article is one of three written by three department heads in answer to the question: "What would you say if you could talk to the 3,500 platform employees face to face on what would tend to better co-operation on the part of the platform men in connection with the work of your division?" Two other articles helpful with suggestions were also printed in No. 3 issue of the "Co-operator." The authors of these articles are H. B. Gould, electrical engineer, and P. A. Kerwin, superintendent of tracks.

Must Explain Why Service Cannot Be Restored in Spartanburg

An order of the Supreme Court of South Carolina has been served on George B. Tripp, general manager of the South Carolina Gas & Electric Company, Spartanburg, requiring that he appear before that body in Columbia on Aug. 28 to show cause why full railway service should not be resumed in Spartanburg. The order followed the securing of the signatures of Associate Justice R. C. Watts, together with a copy of the supplemental petition of the city of Spartanburg asking for such an order.

The petition of the city claims that the Railroad Commission did not have the power to issue the order of June 22 which authorized the abandonment of service in the city of Spartanburg on July 21. The petition declares that the amendment of 1923 to the act enlarging and defining the powers of the Railroad Commission expressly denied to the commission authority to make such order. The petition charges that on July 22 and before the dawn of July 23, the company removed all of the trolley wires within the city of Spartanburg through which the power to operate its street cars was delivered; that said trolley wires and appliances were a valuable part of the property heretofore dedicated to the service of the public under the charter and franchise under which the said street railway was operated.

The city reviews the history of the controversy which dates back to January of this year. The events leading up to the order of the commission were told in these columns previously. The city in its petition prays that the court issue its writ of mandamus requiring and compelling the respondents forthwith to restore the trolley wires and appurtenances necessary to the operation of the electric railway system in the city of Spartanburg; to restore the torn up and dismantled portion of its railway track in the city of Spartanburg; to resume operation of its electric railway systems in the city of Spartanburg and restore and maintain adequate car service thereon, and for such other relief as to the court may seem just.

President Tripp stated that he had no comment to make concerning the move of the city to compel the traction company to restore railway service in the city. Service was abandoned on July 22.

Commission Engineers Drawing Up Subway Plans

Approval was given on Aug. 3 by the Board of Estimate of New York to the two Brooklyn-Manhattan subway routes.

F. D. Waterman, chairman of the Committee of One Thousand, which urged the prompt construction of a new subway in Brooklyn and another in Manhattan, wrote the Transit Commission about the need of haste by the commission in doing its part to provide these added facilities. He said it was up to the Transit Commission to draw up the plans, which in turn must go back to the Board of Estimate for approval in detail. Mr. Waterman said that the Committee of One Thousand would suspend its active campaign for the time being, but that it would not disband.

Chairman George McAneny of the New York Transit Commission said that that body would have its engineers begin on Aug. 6 the task of drawing up plans.

$60,000,000 Tunnel Project Under Way

Work has been started on the Staten Island tunnel, connecting Brooklyn and Richmond. There are to be twin tubes for the use of both passenger and freight traffic, and their length between portals will be more than 5 miles.

The estimated cost of the project is $60,000,000. With railroad connections at Bay Ridge, Brooklyn and at Arlington, S. I., the total distance involved will be about 10 miles. The subaqueous section of the new tube will be 10,500 ft.

The municipal tunnel under the Narrows was directed by a legislative act, passed in 1921, and construction is carried on under a War Department permit, issued last September. The project is designed to maintain the supremacy of the port of New York.

The first digging is the construction of the Shore Road shaft in Brooklyn. The contract for this portion of the job was awarded by the Board of Estimate to Patrick McGovern, Inc., for $495,000. It involves the furnishing and erecting some 1,300 tons of structural steel, placing of 5,000 cu.yd. of concrete and excavating 10,000 cu.yd. of earth under compressed air.

The same contractor received the award for the building of the St. George shaft on Staten Island. The agreement was signed last month.

The new tube will have tracks not only for railroad freight and passenger traffic, but there are plans to use the underground way for rapid transit. Engineers of the Transit Commission, however, expressed disapproval at putting subway trains in the same tube with railroad freight cars. This is one of the questions yet to be worked out. At all events, the Narrows tunnel will give a direct rail connection between the roads entering greater New York from opposite sides.

Arbitration Proceedings Under Way

Arbitration proceedings were started in Boston on Aug. 8 to settle the differences between the Boston Elevated Railway Company and its employees. George L. Mayberry, a Boston lawyer, has been agreed upon as the chairman of the board of arbitration with James H. Vahey representing the carmen and Charles W. Mulcahey representing the company.

There are five matters that the union officials and the company officials have been unable to agree upon, and which, therefore, went to arbitration. They are rate of wages; differential between wages of two-man car operators and the operators of one-man cars and buses; shorter working day on Sundays and holidays; one day off each week with pay; and increase in the eight-hour runs. Any adjustment which the board makes will be retroactive to July 1, and will remain in force one year.

The men are demanding 91 cents an hour, as a basic rate; they are now receiving 61 cents. They are demanding a large increase for the one-man car and the bus operators, up to $1.20 an hour for the latter if the two-man car operators should be awarded 80 cents. They want to work only six hours on Sundays and holidays, with pay for eight hours.

Love Your Enemies Slogan in St. John

"An eye for an eye, and a tooth for a tooth" is a philosophy with which the New Brunswick Power Company, St. John, N. B., has no sympathy. It believes in returning good for evil. For the past two years the company and the city of St. John have been in the throes of a conflict over the distribution of hydro-electric current. The company sought the right to distribute the current in St. John and suburban communities, while the city decided to install a civic distribution system, connecting with the hydro plant at Musquash River, 15 miles from St. John.

Despite the fact that the city has been installing poles, ornamental lights, transmission wires, distribution station, etc., in direct competition with the company, the company has not curtailed its scheduled plans for improvement in all services. New rails are now being laid through the principal streets of St. John. The roadbed in various parts of the city is also being repaired. Additional rolling stock is being purchased. Despite many rebuffs received from the representatives of the city, the company is improving its railway service.

Although the company is apparently passive in its attitude toward the city, yet it is going to fight, in its own way, the city's going into the light and power business. Substantial reductions have already been made by the company in house lighting rates. The civic distribution system that was to have been ready for operation in May is not yet ready and indications are that it will not be in operation until the latter part of August, and then only to a comparatively slight degree. The New Brunswick government insists that the city pay $12,000 for the month of June, although no current was used because of a contract entered into by the City Council of St. John, under the provisions of which the city guaranteed this sum to the government for June, whether or not current was taken.

The Federal Light & Traction Company is the new owner of the New Brunswick Power Company. Its management representative is Sanderson & Porter.

Jersey Men Still Out

President McCarter Insists Upon Comprehensive Settlement of Present Problem—More than Men and Money Involved

Efforts so far made to compose the differences between the Public Service Railway of New Jersey and its employees, now on strike, have all failed. In consequence local transportation in New Jersey in the territory formerly served by the company is still all being given by jitney. As President McCarter sees it, to use his own words, the matter has gotten beyond negotiations between the men and the company. He says that his statement still holds good that he will be glad to see the men any time they choose to confer with him, but "in the present posture of affairs I cannot conceive of anything that would be accomplished by such a conference."

PUBLIC MUST BE CONSIDERED

This is the attitude taken by Mr. McCarter in a letter of Aug. 8 to President Osborne of the Board of Public Utility Commissioners, in which the head of the railway says further that "it is time for all who are charged with any responsibility in this matter to work out a comprehensive settlement." It was for this purpose, said Mr. McCarter, that he suggested a conference with the board in an earlier letter.

On the other hand, Mr. Osborne takes the attitude that the public is entitled to transportation facilities. He threatens that if the company and its former employees assume an arbitrary and unreasonable attitude, and thus make the prompt resumption of service impossible, "the present jitneys will be augmented sufficiently to give the public adequate permanent service."

He says that the desire of the company to protect the investment of its security holders is a duty of the company and that the men may desire to protect their jobs, but that in his view the company and the men should make further efforts to compose their differences. In the event of failure he says the board may then be called upon to act in accordance with its statement of Aug. 6. As a basis for negotiations he suggests:

> 1. An immediate conference between representatives of the company and the men.
>
> 2. An immediate temporary advance in wages, with a further increase after a seasonable lapse of time, the amount and the time to be agreed upon in conference and to be consistent with the prevailing wages in the industry and with the company's resources.
>
> 3. The taking of steps by the company to effect a reorganization if its financial structure to include the cutting off of non-paying lines not necessary to co-ordinate the service as a whole, where it is apparent that buses could better and more economically serve the public.
>
> 4. The seeking of co-operation of the various municipal authorities with a view to maintaining such service by bus as may be necessary, but restricting and rerouting buses so that ruinous competition may be reduced to a minimum and the public afforded a more comprehensive and efficient transportation system.

Mr. Osborne says that in agreeing to such a conference he would not consider either party committed to or bound in any way by the suggestions just set down. They were offered by him merely in the hope that both sides to the controversy, having a due regard for the public interest, might find in the suggestions a common ground for the adjustment of their differences.

SIX-MONTH PERMITS FAVORED

Reverting to the statement of Mr. Osborne of Aug. 6, the chairman of the commission said at that time that unless the company and the employees were quick to compose their differences the board stood ready to approve so-called long-term permits for the operation of jitneys now running under the present emergency regulations. He said:

> The parties to the controversy should not lose sight of the fact that their paramount duty is to the public. They can accomplish nothing standing at arm's length. There can be no doubt that some reasonable settlement is possible and negotiations should now be in progress to that end.
>
> Unless an immediate effort is made by the company and the men to compose their differences, the Board of Public Utility Commissioners will indicate to the various municipalities affected its willingness to approve of long term permits for the operation of jitney buses to meet not only the present emergency, but to insure the public the future service to which it is entitled.
>
> The board will, furthermore, under the statute, call upon the Public Service Railway to show cause why it should not furnish safe adequate and proper service as required by law and the provisions of its charter.

Thomas L. Raymond, Director of the Department of Streets and Public Improvements of Newark, in a statement on Aug. 6, declared that if the cars were not in operation by the next morning or if a plan for the immediate resumption of service was not placed in his hands by that hour he would issue 200 six months' permits to jitney owners.

The commission met on the morning of Aug. 9. Edmund W. Wakelee, vice-president of the railway, sent word to Mr. Osborne that the latter's suggestion made on the afternoon of Aug. 8 looking toward a conference of the company and the strikers would receive due consideration. At noon the board was reported still to be going over the entire situation with a view to possible further action. It was said unofficially at that time that the board might defer any definite action on its part until Saturday in view of the statement from Mr. Wakelee.

Mr. Mayo Makes No Promises for Detroit

William B. Mayo, the newly appointed general manager of the Detroit Department of Street Railways, in outlining briefly his policies, stated that he will make no promises as to the future, pending the completion of reorganization of the plant taken over by the city. The work of general manager has been taken up by him at the request of Mayor Frank E. Doremus, and he has assumed the duty as a citizen to offer his best efforts in helping the city solve its transportation problem.

The governing idea with Mr. Mayo is that the citizens of Detroit desire the best railway transportation regardless of the merits or demerits of public operation. As he sees it the Detroit system, as a result of years of unfortunate controversy, had stagnated. The first task is to build a stable foundation. After that has been achieved the much-desired and anticipated innovations and improvements will inevitably come.

Mr. Mayo expressed the opinion that the first problem, namely, the task of securing the confidence of the majority of the people, has been solved.

It was necessary to show, according to the general manager, that the system would be operated without politics; that no expense of the system had been assessed against the taxpayers and that there is no indication whatsoever that there will be.

The street railway officials are hopeful of being able to announce within a few weeks, definite plans for rebuilding the property—plans which could not be developed until the completion of the first year of operation and comparative monthly figures were available as a guide.

Mr. Mayo paid a tribute to employees. He further cited that the men in the Department of Street Railways are not only taking care of Detroit's transportation problems, but that they are in a sense buying the plant outright for the people within a ten-year period.

The report of the Bureau of Governmental Research was referred to in the ELECTRIC RAILWAY JOURNAL for July 7, page 34. The trustees of this bureau are all big business men, among them merchants, bankers and engineers.

Will Spend $65,000 in Electrifying in West Texas

The West Texas Utilities Company, with headquarters at Abilene, has purchased the Roby & Northern Railway, a line 4.542 miles long, extending from North Roby to Roby, and announces that it will spend $65,000 in electrifying this short line. Terminals will be built both at Roby and at North Roby.

The line was constructed in 1915 under charter from the state granting carrier privileges for fifty years. It was the second and successful attempt of Roby, county seat of Fisher County, to get rail connection with the outside world. In 1907 Roby citizens subscribed funds used to project a line from McCaulley to Roby, a distance of about 14 miles, but the financial panic came on and the road gave up its activity, leaving its construction locomotive, caboose and material stranded at Pledger, to which point in 1907 steel had been laid. Years went by before Roby undertook again to get in touch with the rest of the world.

Citizens of Roby in mass meeting May 1, 1915, decided to build, this time from North Roby, nearly 5 miles away, where connection could be made with the Katy. The road was chartered May 4, 1915, with a capital of $10,000, and, the line was completed in the latter part of the year. The first regular train was operated over the line Jan. 3, 1916.

Arbitrators Appointed to Settle Municipal Wage Dispute

Judge Harry J. Dingeman has been selected as the third arbitrator in the wage dispute between the Department of Street Railways and the employees of Detroit's Municipal System. He will act with the first two arbitrators selected, Judge E. J. Jeffries for the employees and Frank D. Eaman representing the city. Aug. 10 was set for the first meeting of the arbitrators.

Two important announcements were made regarding the dispute. One was that the question of wages and conditions of labor and these matters only would be submitted to the arbitrators without delay. The other was that the questions of recognition of the union and of open shop would be dropped from consideration for the present.

Officials of the union repeated their denials that the demand had been made for recognition of the union and the closed shops, the discussion of which, according to Mayor Doremus, was prohibited by the city charter.

On the municipal lines, platform employees now receive 56¼ cents, 59¾ cents and 62½ cents an hour with 75 cents an hour for overtime work in excess of eight hours. One-man car operators are paid 5 cents an hour more than other platform men. Employees of the D.S.R. are also given one week's vacation with pay each year.

News Notes

Ordinance Again Defeated.—The franchise providing for a renewal of the franchise rights of the Alton, Granite & St. Louis Traction Company in Alton has been defeated for the second time. Alderman Pastorius moved the rejection because the company had failed to deposit $50 required of firms or corporations introducing ordinances.

Men Seeking Increase.—The contract of the Macon Railway & Light Company, Macon, Ga., with the employees of the railway lines expired on Aug. 1. The men are demanding an increase in wages before signing a new contract. Under the old scale the wages were 36 to 54 cents an hour, depending on the length of service. The company has refused to grant the increase.

Limit of Service Reached.—At a hearing by the Transit Commission on Aug. 2 it was brought out by engineering experts that the rolling stock of the Interborough Rapid Transit Company, New York, N. Y., is not able to maintain a three-minute train schedule. The hearing was on an appeal by the traction company on the commission's three-minute order.

Working for Personal and Equipment Cleanliness.—The management of the East St. Louis & Suburban Railway has adopted a plan whereby all motormen and conductors who meet certain requirements as to cleanliness are given a one-day holiday with pay. Recently, President Sawyer wrote letters to thirty conductors and motormen informing them that they had won the coveted holiday. It is the aim of the company also to have the East St. Louis cars the cleanest of those in any industrial city in the country.

Insuring Employees. — The Public Service Inc., New Orleans, through H. B. Flowers, president and general manager, is soliciting group life insurance upon each of its 4,100 employees, men and women alike, with the view of presenting to each of them, without expense to the insured, a life insurance policy, the amount of the policy to be graded according to the seniority, in service, of the employee. The award will be made by contract, through competitive bidding. The total face value of the policies to be written under the contract is estimated at $4,100,000.

Closer Contact for Public Relations Department.—Transfer of the department of public relations of the Indiana, Columbus & Eastern Traction Company and the Columbus, Newark & Zanesville Traction Company from Springfield to Columbus, Ohio, will be made soon according to an announcement from headquarters in Springfield. The transfer will bring the department in closer contact with activities that are centralized at Columbus and permit it to function more smoothly. Arthur V. Bland, director of public relations, and Robert H. Bryant, William Culp, Paul M. Culp, and J. W. McCloy will go to Columbus as members of the department.

Company Purchasing Property. — Plans are rapidly being developed by the Monongahela West Penn Public Service Company, Fairmont W. Va., for a terminal in Fairmont. In connection with such plans several purchases of property in the heart of Fairmont have recently been made. The latest purchase made by the company is a lot in Fairmont on Locust Avenue. In view of the fact that the railway not long ago purchased what is known as the Arnett property at the end of the South Side bridge in Fairmont for a terminal site, it is not known just what use will be made of the Locust Street property but it is thought that the latter may be used as a temporary terminal.

Foreign News

A Novel Car at Hull, England

Experiments are now being conducted on the Hull city tramways with a car designed by E. L. Rayner, the general manager, which has several interesting features. The greatest novelty is a double worm drive. The whole vehicle is of specially light construction, as though it seats sixty-four passengers, its weight is only 8 tons. The stairway to the top deck is in the interior.

Suggested Improvements by London Employees

During the twelve months ended June 30, 1923, no fewer than 3,833 "Suggestions" were received by the London Underground Railway Company from the staff. Of these, 300 were accepted and awards made. Since 1917 a total of 22,850 "Suggestions" have been made and they continue to arrive at an average rate of 320 a month. The Underground Suggestions Bureau has been in existence in 1910.

London Underground Dividends

For the past half year the companies associated in the London underground railways group have, in addition to the payments on preference stocks, declared the following dividends on their ordinary stocks: Metropolitan District Railway, 1½ per cent (being the same as a year ago); London Electric Railway, 2 per cent (against 1¾ per cent); City & South London Railway, 2 per cent (compared with 1¾ per cent); Central London Railway, 2 per cent (the same as last year); London General Omnibus Company, 4½ per cent tax free (against 4 per cent).

London Traffic Regulation

At last there seems to be a prospect of something being done to constitute a general street traffic authority for Greater London. Such a step has been discussed and advocated for many years, but conflicting interests and politics have stood in the way. In face, however, of the growing street congestion, which has in many places become intolerable, the Ministry of Transport has for some time been directing special attention to the subject. In June and July the Parliamentary Secretary to the Ministry held conferences with representatives of local authorities, tramway and omnibus undertakings and others concerned, and the expectation is that in the coming autumn the government will introduce a bill in Parliament to deal with the subject. The scheme will probably embrace a wide area around London as well as the metropolis itself. A proposal that appears to find favor is that the Minister of Transport should be authorized to deal with problems of London traffic on the advice of a committee consisting of representatives of the Home Office, the Metropolitan Police, the county councils of London and surrounding counties, transport undertakings and transport workers. Probably a scheme of this kind would not meet with the opposition which might be raised in many quarters to the constitution of an independent expert traffic board with more or less autocratic powers. That such a board should be formed, with powers to initiate new schemes for transport, was recommended by a royal commission nearly twenty years ago, and varieties of the proposals have since then been put forward by various committees appointed to examine the question.

Cheap Railway and Bus Through Fares

The London Underground companies began an experiment on July 1 to bring the countryside nearer to central London by the introduction of through tickets from the principal stations in the central London area to the outlying country districts served by rural motor bus. These tickets will be issued on Sundays and bank holidays and will have the effect of cheapening the journey from central London and shortening the motor bus rides through the congested streets of the central area.

The combined fare for railway and bus is remarkably cheap. For a total distance of 16 miles the charge is 1s., and for 26 miles it is 1s. 9d.

Finance—A Great Improvement

The tramway accounts of the London County Council for the year ended March 31, last, show a surplus of £230,250 after payment of all charges including interest and sinking fund. For the previous year there was a deficit of £88,757. The total revenue was £4,895,605, as compared with £5,160,320 in the previous year. The working expenses were £3,660,577, against £4,386,891. The gross surplus was thus £1,235,028, against £773,429. After deducting cost of renewals, interest, sinking fund; income tax, etc., the net surplus was £230,250, as above. The working expenses (excluding renewals) per car-mile were 13.86d., compared with 17.68d., while the passenger receipts per car-mile were 18.13d., against 20.39d. The number of passengers was 733,811,367, against 688,151,316. For the current year it is estimated that there will be a net surplus of £78,617.

Operation to Start

The Domodossola Locarno Electric Railway in Northern Lombardy of meter gage and 1,500-volts d.c. will start operation the latter part of this summer. It gives a direct connection between Locarno, the Swiss city on Lake Maggiore, and Domodossola, the southern terminal of the Simplon Tunnel electric line. Although almost entirely on Italian territory, it will serve mostly Swiss traffic, as it is the only direct connection between the Swiss cantons of Valais and Ticino. The first consignment of motor and trailer cars has been received from the Carminati & Toselli Car Works, Milan.

More Underground Station Improvements in London

The last nine years have seen a great increase in the traffic at the two underground stations at Tottenham Court Road, London. In 1913 the number of passengers making use of both Hampstead line and Central London line stations amounted to 20,000,000. Last year the number had increased to 28,000,000. This remarkable growth in traffic has made it imperative for some scheme to be introduced whereby the transit of passengers from booking hall to platform level can be accelerated. Contracts amounting to £125,000 have been placed with Messrs. John Mowlem & Company and Messrs. Waygood Otis for what is virtually an entire reconstruction of these two stations.

The Central London station will be abandoned and the present Hampstead line booking hall beneath the road level will be enlarged and will act as a common booking hall for the traffic of both lines. Moving stairways will convey passengers from this common booking hall direct to the platform level. Further, the present arduous stairs and subway interchange between the two lines will be no longer necessary. Hampstead line passengers wishing to change on to the Central London line will be able to do so by escalator.

With a view to minimizing street accidents at this important junction where Tottenham Court Road, Charing Cross Road and Oxford Street meet, from the site of the present Central London station a subway will also be constructed connecting with the booking hall beneath the road. Passengers will therefore be able to gain the station without having to cross the road at this busy point. In the enlarged booking hall passimeters will also be introduced, thereby further speeding up the handling of the traffic.

When the improvements are completed, not only will congestion be entirely avoided but it is estimated that the time taken between entering the booking hall and reaching the platform will be reduced by half a minute. It is estimated that five seconds per train will be saved in the loading of the northbound trains to Highgate and Golder's Green during the rush hours by the introduction of escalators.

Track Switches in Milan

The Milan municipal railway has decided to install electrically operated track switches at a large number of busy traffic points. The switches so far installed are of Oerlikon make. Switch-points and frogs are mainly of Edgar Allen, Ltd., Sheffield.

Financial and Corporate

Cuban Company Makes Good Showing

Railway Department of Company in Havana Shows Net Earnings Increase of 15.1 per Cent in 1922

The net profit of the Havana Electric Railway, Light & Power Company for the year ended Dec. 31, 1922, was $2,235,881. So far as the railway department is concerned the results showed a decrease of 3.96 per cent in gross earnings, but an increase of 15.1 per cent in net earnings compared with 1921.

CONDENSED PROFIT AND LOSS ACCOUNT OF HAVANA COMPANY FOR THE YEAR ENDED DEC. 31, 1922

	Railway Department	Light and Power Department	Total
Gross earnings from operation..........	$5,756,438	$7,154,268	$12,910,707
Operating expenses......	3,689,592	2,262,856	5,952,449
	$2,066,846	$4,891,412	$6,958,258
Deduct			
Taxes, U. S. A.	$20,746	$28,000	$48,746
Taxes, Cuba...	33,400	271,000	304,400
Trigo Annuities	3,373	....	3,373
Interest.......	616,188	470,819	1,087,007
	$673,707	$769,819	$1,443,526
	$1,393,139	$4,121,593	$5,514,732
Deduct			
Reserve for depreciation...	$589,370	$1,710,629	$2,300,000
Reserve for contingencies...	153,749	446,252	600,000
	$743,119	$2,156,881	$2,900,000
	$650,019	$1,964,712	$2,614,731
Add			
Interest on deposits....................			$88,122
Income from securities................			18,554
Rents....................................			38,190
Other miscellaneous income............			44,187
			$189,053
			$2,803,784
Deduct			
Miscellaneous accounts written off, net....................		$120,468	
Amortization of discount and expenses on funded debt....		130,557	
Provision for sinking fund of thirty-seven-year English 5 per cent mortgage bonds of compañia de Gas y Electricidad de la Habana.........		15,949	
Provision for sinking fund of consolidated mortgage 5 per cent gold bonds of Havana Electric Railway..........		131,666	
Provision for sinking fund of general mortgage 5 per cent sinking fund gold bonds of Havana Electric Railway, Light & Power Company...		135,513	
Premium on redemption of five-year 7 per cent secured convertible gold notes, dated Sept. 1, 1921..............		33,750	567,903
Net profit for the year, carried to surplus account....................			$2,235,881

At the beginning of the year 1922 the operating schedule required 434 cars on week days and 435 cars on Sundays. During the year it was increased to 443 cars on week days and 452 on Sundays and one new line was added, making the total thirty-five. The largest number of cars in circulation at one time was 478 on March 5, Piñata Sunday, the second Sunday of Carnival.

For the first time since 1915 the railway earnings decreased. The increases in 1921 and 1920 were unprecedentedly large. If, instead of taking the actual figures for the past three years (1920, 1921 and 1922), the figures are extended over the average rate of increase found in 1916 to 1919 inclusive, the results are within 3 per cent of the actual earnings.

Just as in the two other principal departments, the feature of the year was the increase in net earnings due to the reduction of operating expenses, and it is worthy of note that the gain in net earnings was more than $100,000 greater than it was in 1921, although in that year there was also an increase of 18 per cent in total earnings. The saving in 1922 was due to the combination of several factors, the salient ones of which were: the readjustments of wages of common labor in July, 1921, of conductors and motormen and carhouse men in September and October, 1921, and of shop men in February, 1922, the lower cost of fuel for the power plant, reductions in the cost of all maintenance material, and improvements in the organization and equipment of the shops and the track department, all of which will be further described under the appropriate headings.

There were no labor disputes and relations with the entire personnel of the railway division were excellent. The readjustment of the pay of mechanics and other skilled workmen, in February, was combined with a number of changes and improvements in the classification and distribution of work, especially in the car shops.

The total payroll of this division was reduced by about $3,500 per month.

The results obtained from the new model cars put in service in 1921 and 1922 were so satisfactory that it was decided to build more of them instead of reconstructing cars of the old type that were too short to accommodate eighteen seats. Eight were built for replacement in 1922.

STATISTICS OF RAILWAY SERVICE AT HAVANA

	1921	1922	Increase over 1921	
Total number of passengers carried..........	116,272,911	113,011,816	3,261,095*	2.80%*
Passenger car miles.........................	17,624,763	17,532,658	92,105*	0.52%*
Passenger earnings	$5,813,645.55	$5,650,590.80	$163,054.75*	2.80%*
Passenger earnings per car mile	32.99	32.22	.0077*	2.33%*
Total earnings from operation...............	$5,993,610.70	$5,756,438.47	$237,172.23*	3.96%*
Total operating expenses....................	$4,197,911.11	$3,689,592.87	$508,318.24*	12.10%*
Total operating expenses per car mile........	23.82	21.04	.0278*	11.67%*
Operating ratio..............................	70.40%	64.10%	....	....
Net earnings from operation..................	$1,795,699.59	$2,066,845.60	$271,146.01	15.10%

*Decrease

New York Lines Improve

City Lines Taken as Whole Show $339,693 Net Corporate Income for Ten Months

The street railway lines of New York, including the subway and elevated companies, for the first ten months of the fiscal year 1922-1923, that is, from June to April, inclusive, show a materially improved financial condition, according to figures compiled from the monthly reports of the companies and made public by the New York Transit Commission. The companies, taken as a whole, show a net corporate income of $339,693. For the corresponding ten months of last year they showed a deficit of $3,110,532.

The reports for March and April show the highest mark yet reached by the various lines in their recovery from the conditions arising out of and following the war.

The tabulation below gives the results by months, those months in which there remained an actual deficit, namely, July, August and September, 1922, and January and February, 1923, being indicated:

Month			Net Corporate Income or (D) Loss	Improvement Over Corresponding Month of Last Year
July,	1922	D	$135,977	$516,869
August,	1922	D	380,630	214,142
September,	1922	D	158,132	96,007
October,	1922		90,062	431,342
November,	1922		61,696	178,170
December,	1922		169,268	247,054
January,	1923	D	10,849	273,900
February,	1923	D	369,462	160,467
March,	1923		510,286	340,046
April,	1923		563,422	312,836
			$339,693	$2,770,838

In April the subway and elevated lines of the Interborough and the former B. R. T. companies showed a combined net corporate income of $357,401. The net corporate income of the Interborough subway lines amounted to $312,557, and of the B. R. T., now the B.-M. T. rapid transit lines, to $159,022. The Manhattan elevated lines of the Interborough system, however, despite the efforts which have been made to build up traffic on those lines, still showed a deficit of $114,178.

The surface lines of the city had $206,020 net corporate income for April. The best showing was made by the Brooklyn City Railroad, with net corporate income of $221,513. All of the Brooklyn surface companies showed net corporate income except the Brooklyn Heights and the Coney Island & Gravesend companies, which reported deficits of $59,743 and $12,142, respectively.

The New York Railways showed an April balance on the wrong side of the ledger of $152,881. This large deficit, however, was in part offset by the net corporate income of $83,483 reported by the New York & Harlem, operating the Fourth and Madison Avenue lines, and by small net incomes for other companies, so that as a whole the surface lines on Manhattan Island showed a net corporate deficit of $70,900.

All of the lines in Queens showed

deficits, while in Richmond, though the Richmond Light & Railroad Company showed a net corporate income of $51,338, the municipally operated Midland lines showed a deficit of $1,452.

The Transit Commission has also made public abstracts of the reports of several of the companies for the month of May. Among these companies the Interborough showed a net corporate income of $240,659, an increase of $248,648 over May, 1922, when a deficit of nearly $8,000 was reported. The subway lines in May showed a net corporate income of $301,473, an increase of $38,445 over May, 1922. The deficit on the elevated lines for May was $60,814, as against $271,017 in the previous May. The big drop in the elevated deficit is, of course, due largely to the Interborough reorganization, under which, at the instance of the Transit Commission, the fixed charges of the company, in respect of its elevated obligations, were greatly reduced.

The New York Consolidated Railroad, now the New York Rapid Transit Corporation, of the B.-M. T. system, showed for May a combined net corporate income of $237,681, as against $162,656, a gain for the year of more than $75,000.

The Third Avenue Railway system, consisting of the Third Avenue Railway, the Union Railway in the Bronx and other controlled companies, showed a net corporate income for the month of $52,568, which was, however, a decrease of $16,981 from the May, 1922, figures.

The New York Railways, through its receiver, Job E. Hedges, reported a net deficit for May of $150,475, as against a deficit in May, 1922, of $123,332.

The Interborough in May, 1923, carried 91,670,511 passengers. This was slightly over 4,000,000 more than in May, 1922. The New York Consolidated's May passenger traffic was 45,132,423, an increase of about 4,700,000 over the previous May. The Third Avenue system, with 5,316,509 May passengers, showed a falling off from May, 1922, figures of 139,000. A decrease of passengers carried was also shown by the New York Railways report, the traffic of 13,687,205 being less by 960,899 than that in May, 1922.

Wisconsin Railways Earned 3.12 per Cent in 1921

Due to the ever-increasing demand for gas, electric, telephone and electric railway services, the public utilities of Wisconsin show a tremendous growth in the amount of money invested in the business, in the total revenues received and in the number of customers served. These facts are all brought out in the latest report of the Railroad Commission of Wisconsin, which does not include the figures for 1922.

The investment in electric railways and city lines also showed an increase, although here, too, the increase was not nearly so marked as in the case of electric utilities. The property and plant accounts for 1921 totaled $83,018,480, as compared with $80.229,520 in 1920 and $72,534,563 in 1917. While the operating revenues increased from $11,323,223 in 1917 to $20,300,808 in 1920, by the end of 1921 they had dropped to $19,662,146.69. The rate of return for electric railways is much smaller than that of any other utility. In 1917 the rate of return was only 4 per cent. By 1920 it had dropped to 2.76 per cent. Although 1921 showed a better return than 1920, the rate was only 3.12 per cent.

The total amount of capital invested in all electric utilities in Wisconsin was $116,564,856, an increase of $12,064,488, or 11.5 per cent over the property value of 1920, and $44,528,615, or 61.8 per cent over that in 1917. The rate of return for 1921 on the money invested was 6.99 per cent.

Street railways carried in 1920 287,905,241 passengers and in 1921 265,392,587, a decrease of 7.8 per cent.

Boston Elevated Pays Back $1,631,753

Five years have now elapsed since the operation of the Boston Elevated Railway passed into the control of trustees appointed by the Governor of the Commonwealth. During the first year increasing costs of operation exceeded the revenue obtainable under a 5, 7 and 8-cent fare. An actual deficit occurred of $5,415,500 divided as follows:

$1,000,000	in the reserve fund exhausted.
3,980,151	assessed against cities and towns
435,348	back pay occuring in May and June, 1919, under an arbitration award.

At the present time the $1,000,000 reserve fund has been restored, the $435,348 back pay has been absorbed, and two payments, one of $517,196 and the other of $1,114,557 have been made to the cities and towns. Therefore 57 per cent of the 1918 deficit has been overcome, leaving $2,348,397 still due the municipalities. Edward Dana, general manager of the railway, said:

> Our efforts cannot in the public interest be directed solely along one line. We have, however, made creditable reduction in the deficit, reduced the fare (26 per cent of the riders or 100,000,000 a year now ride for 5 cents), and we have improved the service with new cars, new track and increased mileage.
>
> We are proud of our calling and we have proved that co-operation gets results.

COMPARATIVE DIVISION OF RECEIPTS AND EXPENDITURES OF THE BOSTON ELEVATED RAILWAY FOR THE YEARS ENDED JUNE 30

	1923	1922	1921	1920	1919
Total receipts	$33,612,335	$32,781,493	$34,224,149	$32,689,200	$25,223,495
Operating expenses:					
Wages	$15,024,348	$14,920,407	$16,753,669	$16,381,207	$13,554,685
Material, supplies and other items	3,149.688	3,056,520	2,899,983	3,321,671	4,096,537
Injuries and damages	700,741	476.844	627.629	627,626	805,353
Depreciation	2,004,000	2,004,000	2,004,000	2,004,000	2,004,000
Fuel	2,027,712	1,656,012	2,399,277	1,996,717	1,901,596
Total operating expenses	$22.906,489	$22,113,783	$24,684,558	$24.331,221	$22,362,171
Taxes	$1,722.707	$1,610,097	$1,306,738	$1,075,497	$941,612
Rent of leased roads	49,194	2,549,625	2,673,166	2,607,567	2,587,129
Subway and tunnel rents	2,025,263	1,974,141	1,947,963	1,591,323	1,491,999
Interest on B. E. bonds and notes	2,277,051	1,483,787	1,483,625	1,593,257	1,423,144
Miscellaneous items	65,986	58,475	54,479	69,284	37,372
Dividends	3,136,854	1,606,372	1,523,367	1,403,971	1,360,220
Total cost of service	$32,183,545	$31,396,281	$33,673,896	$32,672,120	$30,203,647
Gain	$1,428,789	$1,385,211	$550,253	$17,079	....
Loss	....	....	....	....	$4,980,152
Back pay applying to May and June, 1919, but paid in October, 1919					$435,348
					$5,415.500

Stockholders Win Fight Against Mortgage Payment

Stockholders of the old Cincinnati, Dayton & Toledo Traction Company won a second victory in their fight against paying the balance of a bond mortgage of the extinct Southern Ohio Traction Company, when the Court of Appeals at Cincinnati handed down a decision affirming Common Pleas Judge Stanley C. Roettinger's action in sustaining demurrers which they had filed to the suit to assess stockholders' liability against them. As a result of the decision, approximately 4,000 stockholders of the Cincinnati, Dayton & Toledo escape paying approximately $1,000,000 to the holders of the Southern Ohio Traction Company's bonds.

The Southern Ohio Traction Company was organized in 1900, when the old double liability law was in force. When the Cincinnati, Dayton & Toledo and its subsidiaries consolidated and took over the Southern Ohio Traction, the Ohio constitution had been changed and single liability only was in force, and while the new company assumed all the debts of the old, its contracts specified and its stock certificates contained the specification that the new stockholders were not to be liable for the bonds issued by the Southern Ohio Traction Company.

When the bondholders sued to enforce stockholders' liability to pay the balance due on their bonds, after the sale of the mortgage security, it then was claimed that it was against public policy to relieve the new stockholders of liability on the old bonds, but the Common Pleas Court sustained a demurrer to this, and the matter went to the Appellate Court. In its decision the Court of Appeals says that the contract was between individuals and no public right was affected by it in any way, and, therefore, it was not a matter which comes under the rule of public policy, but one which must stand entirely upon the wording of the contract made when the money was lent. In other words, the decision declares that a debtor cannot change his security by claiming his contract is against public policy.

These bonds, aggregating $1,000,000, are held by the Cleveland Trust

Company. They were issued by the Southern Ohio Traction Company, which was formed by the consolidation of three lines between Cincinnati and Dayton, and the trust company sought to hold the stockholders of all these subsidiaries and of the Cincinnati, Dayton & Toledo Traction Company, which later was formed and took over all the properties. Under the decision by the Court of Appeals, which was written by Judge Wade Cushing, and concurred in by Judges Robert Z. Buchwalter and Francis M. Hamilton, the Cleveland Trust Company is stopped from recovering from these stockholders.

Reorganization Plan for Michigan United Modified

Securities of the new company to succeed the Michigan United Railways, sold recently under foreclosure to the reorganization committee, are expected to be ready for distribution about Oct. 1. The sale was conducted on June 30. It has already been confirmed by the court. Application is now before the Michigan Utilities Commission for approval of the issuance of the new securities.

In this connection it has been announced that the plan of reorganization has been changed slightly, more nearly to meet the ideas of the holders of some of the outstanding issues of securities. The work necessary in connection with the adjustment of this matter had the effect of delaying the reorganization, but the matter is believed now to be moving fast toward conclusion.

Objections to the plan came from certain holders of the debentures and of preferred stock who contended that the plan did not yield to holders of the debentures and of preferred stock of the old company securities having a preference over the securities yielded by the plan to the holders of the common stock of the present company. The amendments which have been adopted by the committee may be summarized as follows:

1. The preferred stock to be distributed to bondholders will be called "Class A preferred stock," but will remain unchanged in preference position, dividend rate and all other respects.
2. Subordinate to the Class A preferred stock, a Class B 5 per cent non-cumulative preferred stock of an aggregate face value of $400,000 will be created. This stock will be sold to provide funds for paying reorganization expenses.
3. Subordinate to the Class A preferred stock and also to the Class B preferred stock, a Class C 5 per cent non-cumulative preferred stock will be created and distributed among depositors of debentures and of preferred stock of the present company; the debenture holders to receive one share of Class C preferred stock for each $100 of debentures deposited; and the preferred stockholders to receive one share of Class C preferred stock for each two shares of the old preferred stock deposited.
4. The bonds to be issued and sold provide funds with which to retire the Jackson & Battle Creek Traction Company underlyings, or for the purpose of exchange for Jackson & Battle Creek underlyings have been increased from $1,200,000 face amount to $1,400,000 face amount.
5. All rights of subscription to the securities of the new company have been eliminated. Inasmuch as none of the rights provided by the original plan were exercised, the committee deemed it unnecessary to carry such rights into the amendments.
6. No common stock is offered to depositors of debentures or of preferred stock of the present company and no common stock is offered for sale to provide funds for reorganization expenses. All of the new common stock is given to the holders of the common stock of the present company.

Hearings on Bronxdale Boulevard Resumption

Two hearings have been held before the New York Transit Commission to determine whether the Bronx Traction Company, a subsidiary of the Third Avenue Railway system, shall be ordered to resume service from Bronxdale Boulevard to Williamsbridge Road in Morris Park Avenue.

No service has been operated on this part of the line for several years. The city is contemplating the paving of Morris Park Avenue in the stretch covered by the railroad, which will require the relocation of the trolley tracks. The company seeks to abandon the tracks beyond Bronxdale Boulevard, and has filed an application to that effect with the commission. Witnesses called by the commission testified that the tracks are still in the street and could be operated in their present condition, with slight repairs and the setting of new trolley poles, but if the street is to be paved, more work would be required. It was brought out at the second hearing by the company that to add one car which would be required for the operation of the additional half mile, would cost $65 a day—a sum which would require 1,300 passengers to meet operating costs alone. The commission witnesses asserted that this figure was absurd. The case was taken under advisement by the commission.

Auction Sales in New York.—At the public auction rooms of A. H. Muller & Sons there were no sales of electric railway securities this week.

Six Months' Net $779,650.—The net income of the Market Street Railway, San Francisco, Calif., for the month of June was $120,816. For the six months ended June 30, 1923, the net income totaled $779,650.

Passengers Increase. — The United Railways of St. Louis during the quarter ending June 30, 1923, carried 71,768,428 passengers compared with 69,882,601 in the preceding quarters, an increase of 1,885,827. The average number of cars operated during the quarter was 1,291 compared with 1,280 in the preceding quarter.

Earnings $3,090,287.—The American Light & Traction Company and its subsidiaries, for the twelve months ended June 30, 1923, have reported earnings of $3,090,287. This is after all charges, including depreciation, replacement reserves and preferred dividends. It is equivalent to $10.22 a share on the company's $30,040,400 common stock.

Wants Record of Mortgage Established.—The Williamsport Passenger Railway, Williamsport, Pa., has filed a notice in court to establish a record for a mortgage dated Dec. 15, 1866, executed to secure bonds of $10,000. No satisfaction of payment of the bonds has been established by record, the company going to court to establish the payment legally. The mortgage was made to Mahlon Fisher and B. H. Taylor, long deceased. The mortgage was given when the passenger railway still used horses.

Petitions on Valuation Rehearings Denied.—The Missouri Public Service Commission has denied the petitions of both the city of St. Louis and the United Railways requesting a rehearing in the railways valuation case. The commission fixed the valuation for rate-making purposes at $52,838,110. The city contended the value was too high and the company that it was too low. The company will ask the Cole County Circuit Court to review the findings of the commission.

Makes Offer on Claim.—The Jersey Central Traction Company, Keyport, N. J., which suspended operations on July 28 appeared before the Middlesex County Freeholders and offered them $600 on a $1,080 claim the county holds against the company for its franchise from 1917 to the present year. The matter was referred to county counsel. The agreement between the traction company and the county called for the payment of $180 yearly since 1903 for franchise rights.

Additional Holding Company Preferred Offered.—An additional issue of $2,750,000 of Electric Bond & Share Company 6 per cent cumulative preferred stock is being offered by Bonbright & Company, New York, N. Y., at 97½, to yield 6.15 per cent. The proceeds of the sale will be used for the expansion of the company's business. Upon completion of present financing total preferred stock authorized and outstanding will be $20,000,000 and total common stock $20,000,000. All the common stock is owned by the General Electric Company.

Transfer of Stock Approved. — The Board of Public Utility Commissioners of New Jersey recently approved the transfer to the Public Service Railway of the $250,000 capital stock of the Emergency Fleet Railway. The Emergency Fleet Company operated a line during the war to carry shipbuilders to their work at Camden. With the exception of the rolling stock and the power house the entire Emergency Fleet Railway lines were constructed by the Public Service Railway. The Emergency Fleet Railway operated a line between Gloucester City and Fairview.

Accepts Lease from City.—The trustees of the Boston Elevated Railway have accepted a lease from the city of Boston for the double-track line previously operated by the Eastern Massachusetts Street Railway in Hyde Park. The rental will be 4½ per cent on $235,000 which is the amount fixed by the Massachusetts Public Utilities Commission as the value of that portion of the Eastern Massachusetts system in Hyde Park. The line extends from the old boundary line to Cleary Square. As a result passengers can now ride from Cleary Square, Hyde Park, to any point on the elevated system for a single fare.

Traffic and Transportation

Receives Evidence

Interstate Commerce Commission Holds Hearing in Los Angeles on Proposed Plaza Union Terminal

The Interstate Commerce Commission, represented by Commissioner Clyde A. Aitchison on July 6, opened up in Los Angeles a hearing to receive evidence in support of the complaint of the city of Los Angeles. The city is seeking an order from the commission requiring the railroads to join in the elimination of the dangerous grade crossings along Alameda Street and the Los Angeles River and better serve the necessities and conveniences of the traveling public.

PLAN TO ACCOMMODATE FOUR RAILROADS

In previous hearings before the California State Railroad Commission the city of Los Angeles approved the Plaza Terminal plans of the commission's chief engineer, as compared with the Arcade Terminal plan submitted by the steam road and electric interurban lines.

At the hearing before the Interstate Commerce Commission Richard Sachse, former chief engineer of the State Railroad Commission, showed how he could construct his Plaza Terminal for approximately the same cost as the Arcade Terminal plan. Mr. Sachse stripped his plan down to actual physical necessities, claiming that his plan would accommodate four railroads, while the other plan would only take care of two lines. His original estimate for his terminal plan was $32,000,000, while his revised figures called for $7,350,700, while the carriers' plan called for a terminal costing $7,331,000.

MANY TRAFFIC STUDIES MADE

Traffic studies by the city of Los Angeles Board of Public Utilities' engineers from the year 1918 to 1923 showed that there had been an increase of 136 per cent in the number of persons crossing in street cars the tracks of the steam road line on Alameda Street, which is one of the vital points in the city's fight to remove the steam road tracks from this thoroughfare in its proposed program of grade separations, which it claims can be accomplished by the construction of the Plaza Terminal.

Henry Z. Osborne, former chief engineer of the Los Angeles Board of Public Utilities and former chief engineer of the Los Angeles Traffic Commission, testified and cited results of his investigation of traffic conditions in Los Angeles since 1901 in support of the city's fight for the construction of the Union Plaza Terminal.

It was the belief of the commissioner representing the Interstate Commerce Commission that it would possibly be more than eighteen months before anything definite can come out of the proceedings now pending in the city's plaza terminal case.

STEAM ROADS SUBMIT REVISED PLAN

An engineer of national repute was retained by the city to inquire into the matter. His testimony for the city's case outlined to the commission the type of union terminal needed for Los Angeles, comparing it with terminals at St. Louis and Kansas City. He planned that the Pacific Electric interurban lines should be required to come into the terminal through a subway, and that the entire terminal should be electrified, since that is the present trend of transportation.

Counsel for the three steam roads and the Pacific Electric lines in offering their plans in opposition to the city's Plaza terminal plan saw fit to withdraw the former plans known as the Titcomb plan, submitting a revised layout with many added features. The revised plans featured the construction of a new terminal station for the Pacific Electric lines at a point from 1,000 to 2,000 feet south of the Southern Pacific Company's present Arcade passenger station.

H. G. Weeks, transportation engineer of the State Railroad Commission, testified as to the needs of a union terminal, claiming the plans as outlined by the city did not seem unreasonable, owing to the rapid development of the community.

Paul Shoup, vice-president of the Southern Pacific lines and president of the Pacific Electric lines, took the stand in opposition to the city's Plaza union terminal plan, testifying that the plans of the defendants' traffic arrangement as suggested by the Southern Pacific-Union Pacific-Pacific Electric Companies would do away with all dangerous grade crossings along Alameda Street and at Los Angeles River, without the necessity of the construction of the terminal.

Safety Survey Placed Under Prof. Swain

Prof. George F. Swain has been placed in charge of the safety survey of the elevated lines in New York City to be made by the city. Prof. Swain is professor of civil engineering at Harvard University. He was formerly president of the American Society of Civil Engineers. According to tentative plans, the Brooklyn lines will be considered first and then the Manhattan overhead routes.

While this work is in progress another activity of the City Transit Bureau will deal with the surface lines. The City Transit Bureau is in charge of John H. Delaney, dock commissioner. This bureau has opened offices in the City Hall in charge of Frank Sinnott.

Jitney Status in Schenectady an Enigma

The Schenectady jitney situation is now in a muddle worse than has developed in any other similar situation. Supreme Court Justice Borst of Amsterdam on Aug. 4 set aside the order of the Schenectady County Judge McMullen which order had nullified the injunction order of Supreme Court Justice Angell restraining the operation of jitneys in Schenectady and vicinity but did not pass on the merits of the original order. As the matter now stands the merits of the original order will be heard at a special term of the Supreme Court on Aug. 11, either before Judge Borst, Judge Angell or possibly both justices.

What has really happened is that judicial courtesy has been offended and all judges being brothers no judge wishes to offend the other. Therefore, whatever merits the case may possess have been swallowed up in the matter of procedure. Probably never before did a county judge upset the order of a Supreme Court justice, although countless times county judges have issued or denied injunctions.

In the interval the jitneys continue to ply and it is extremely doubtful if any contempt orders of the original injunction will be served on any of the jitney operators in Schenectady until the legal aspect of the situation is thoroughly ironed out.

Injunction Against City of Birmingham Reinstated

The indications are that Birmingham jitneys will operate on the streets of the city until November anyway. It will take until that time before the courts can make a final decision of the case, and in the meantime an initiative election will be held.

Judge Lucien D. Gardner, of the Alabama Supreme Court, has reinstated an injunction against the city of Birmingham to prevent the city from putting the jitneys off the streets. Some days ago Judge William Walker of the Birmingham Circuit Court allowed the jitney owners a temporary injunction against the city. Recently, Judge Walker dissolved this injunction and the jitney owners took the matter to the Supreme Court. Judge Gardner allowed the reinstatement of the injunction pending an appeal to the Supreme Court on the matter.

In the meantime the people will be allowed to vote on the question as to whether they want jitneys. Since the passage of the city ordinance, which was to have gone into effect on July 1, thirty-one jitneys have surrendered their licenses. There are still more than 200 jitneys in operation and drivers say they will fight the city ordinance.

In the event the jitney owners win before the Supreme Court or at the election the city and the company will occupy the same positions as they did before the agreement was drawn and signed by both.

Traffic Campaign—Movement of the Hour

An intensive campaign to educate the people of Atlanta on the traffic laws of the city is being waged at present by the Georgia Railway & Power Company, and a complete survey of the traffic needs of the city is being made, as steps in the plan of co-operation between the city and the company following Atlanta City Council's recent action in imposing a $5,000 indemnity bond on jitney operators.

Several weeks ago, the traction company asked that the city take immediate steps to regulate jitneys and enforce traffic regulations, and promised in return to take care of the city's needs in transportation, providing this assistance was given to prevent possible decadence of the city's system.

The City Council of Atlanta accepted the proposals of the company and as a first step toward carrying out the agreement passed the ordinance limiting the activities of jitneys. A move, however, is now on foot in Atlanta to regulate jitneys on the basis of common carriers, subjecting them to the conditions which are imposed on the street railway.

The traffic campaign of the company is taking up each detail of the traffic laws one at a time—devoting space to the movement on the dash signs of the cars, on the inside car cards and in the street car publication, *Two Bells*. Civic organizations in Atlanta are joining in the campaign and recent newspaper articles and editorials indicate that interest is being awakened in Atlanta over the traffic situation.

Chicago "L" Redecorates

Hardly had the eyes of the loop shoppers and workers become accustomed to the brilliant colors recently placed on one of the down-town stations of the Chicago "L" than three trains, each representing a different road, made their appearance upon the loop during the morning rush hour of July 30 and further surprised the patrons and pedestrians with their attractive new dress. A rich deep orange is used above the belt rails with a light green below. The sash have also been painted green, giving the necessary relief above the belt rail to the brilliant orange. The work of repainting the cars has been going on secretly for some time in anticipation of the delivering of 100 new cars, but after three trains were completed it was found necessary to place the revamped rolling stock in service.

The stations, one of which has been completed, are done in the rich orange, trimmed in light green, resembling to some extent the rolling stock. Attractiveness, cleanliness, and advertising qualities are some of the features of the new colors. With the new paint job on the rolling stock, comes the new heading on the letterboards of the car indicating that "Chicago Elevated" will be the name of the new consolidated companies. An outline of the proposed consolidation now in process of negotiation was given in the ELECTRIC RAILWAY JOURNAL, issue of July 21, page 114.

10,000 Maps a Day Requested by Vancouver Public

The British Columbia Electric Railway, Vancouver, B. C., has recently issued a map of its Vancouver city lines, measuring 12 in. x 9 in. in two colors, with car routes and places of interest detailed on the back. Conductors on all city cars received a supply and were instructed to hand them only to passengers who requested them. In three days 30,000 maps were thus distributed, and since then through the same channel and the company's offices a further 10,000 have been distributed.

It is noteworthy that this distribution was obtained without a cent being spent in newspaper advertising. The only copy advertising the map was carried in the company's weekly publication, the *Buzzer* and by means of a card costing $15, displayed in the company's space in its own cars. The map was produced by the publicity department for the purpose of stimulating travel, but has had the effect of creating considerable good will, judging by the expressions of approval received.

The maps, which are printed on 24½ lb. bond, to give long life, cost slightly more than 1 cent each and are expected to prove the cheapest form of advertising transportation.

International Rejects Bailey Avenue Bus Franchise

The International Railway has rejected the one-year franchise offered by the Buffalo authorities for a bus line in Bailey Avenue. The traction company also sought a parallel permit for buses in Delaware Avenue at a 10-cent fare and a 3-cent charge for transfers. The Bailey Avenue franchise was limited to a 7-cent fare with free transfers. The company would not accept the Bailey Avenue franchise without the right to operate the Delaware Avenue line. Failure on the part of the International to accept the Bailey Avenue franchise led Mayor Schwab to issue temporary permits to the Van-Dyke Company to operate buses along this street in competition with the International Railway, which operates cars part of the distance along the avenue. Regular 10-minute service with a 10-cent fare was maintained for two weeks until the courts interfered because of an action started by the railway.

"Passengers Always Right"

The Dallas Railway is conducting a "Merchandising Transportation" campaign, in which the central idea is to educate trainmen and others who come in contact with the riding public to smile, be cheerful, obliging and pleasant in their relations with the public to the end that all who ride the street cars once may be persuaded to ride again. The campaign was planned and launched under the direction of Richard Meriwether, vice-president and general manager, and is in charge of C. J. Crampton, superintendent of safety. A committee of trainmen appointed to outline some rules for motormen and conductors has submitted some good suggestions which have been adopted. Chief among these is "Never dispute a passenger's word—the passenger is always right."

Tokens in Force.—The North Carolina Public Service Company, Greensboro, N. C., on July 1 started using the Johnson fare boxes and tokens. The cash fare is 7 cents, with four tokens for a quarter.

Freight Tariff Rates Filed.—Lake Shore Electric officials have filed tariff rates to Detroit and points north which will be effective for the beginning of freight service on electric roads out of Toledo, beginning Aug. 18. This was announced by J. F. Starkey, general passenger agent.

Petitions for Bus Routes.—The Logan Valley Bus Company, a subsidiary of the Altoona & Logan Valley Electric Railway, has applied for permission to start two new bus routes in the city of Altoona, Pa., as feeders to the traction line. The districts to be served recently petitioned for trolley service.

Picnic Well Attended.—Between 3,000 and 4,000 people attended the second annual picnic of the employees of the Wheeling Traction System on Aug. 2. The greatest interest manifested was in the annual first-aid contest under the direction of Martin Cowan, director of safety of the company.

Better Service Planned.—When the Ohio Valley Electric Railway, Huntington, W. Va., puts into service the new cars ordered some time ago the present schedules will be completely revised looking toward a better and more expeditous service. It is said that virtually all of the cars now in use will be discarded.

Reduced Tariff Announced.—J. P. Mehigan, local general agent for the Milwaukee Northern Electric Railway, announced recently a new reduced freight tariff between points on the Milwaukee Electric Railway & Light Company lines and the Milwaukee Northern Electric Railway in connection with the Eastern Wisconsin Electric Company line.

New Service Announced.—The Seattle & Rainier Valley Railway, failing in its efforts to close negotiations for new automobile buses with which it proposed to give a fifteen-minute service to the city limits, announced a fifteen-minute service on July 8 between Norfolk and the city limits by a shuttle car, connecting with the Rainier Beach cars. The service will be continued until some other plan is arranged.

"Pay-As-You-Leave" Car Giving Satisfactory Service.—The new type of turnstile car described in the ELECTRIC RAILWAY JOURNAL for Dec. 30, 1922, is now being operated by the New York

Railways over the Lexington Avenue route from the Ninety-ninth Street carhouse to the Battery. The car makes four trips a day. Passengers enter at both ends of the car without paying, but make their exit through turnstiles after depositing their fares.

Hearing on Abandonment and Bus Set.—There will be a hearing before Public Service Commissioner Parsons at Elmira, N. Y., on Aug. 20 on the application of the Elmira Water, Light & Railroad Company for approval of the declaration of abandonment of its Seneca Lake division between Horseheads and Watkins. Public hearing will be had on the same day on the petition of William Marshall for a certificate of convenience for the operation of a bus line between Elmira and Watkins.

Will Make Survey.—The City Commission of Oklahoma City has employed traction experts to make a complete survey of the lines of the Oklahoma City Railway showing its earnings and operating costs. This survey is the first step of the city government in its fight to restore the 5-cent fare. The city maintains that the traction company could be operated at a fair profit under a 5-cent fare now, if proper economies were practiced. Action is to be taken to compel the company to restore the 5-cent fare.

Safety First Meeting Held. — More than 500 persons attended the Safety First meeting held in the Ingomar Theater under the auspices of the Washington-Virginia Railway. The meeting was presided over by Thomas H. Travers, claim agent of the road and organizer of the Safety First committee of that road. An address to the employees was made by General Manager A. L. Reynolds and a short history of the inception of the safety first movement was given by Mr. Travers. An address on Safety First was delivered by J. M. Truitt member of the executive committee of the National Safety committee and a director of safety for the United Railways & Electric Company of Baltimore.

Safety Campaign Under Way.—The Chicago, North Shore & Milwaukee Railroad is conducting a novel safety campaign. Employees of the road and their friends are being supplied with small signs reading "This car stops at all railroad crossings." The sign, which is pasted on the windshield and on the back window of the automobile, is in red and immediately catches the eye of another driver, who will undoubtedly take note of it and will appreciate the necessity for such procedure. The company is also issuing a four-page pamphlet entitled "Some Safety Signs that Will Save Suffering and Sorrow." As a furtherance of the educational idea on safety first thousands of these circulars are being passed out to automobile owners traveling through this territory. Operators of all trucks and other vehicles are urged to follow the example set by the owners of private automobiles.

Book Reviews

Engineer Foundation Report

Annual report of the Engineering Foundation for year ended Feb. 8, 1923.

Engineer Foundation was established in 1914, based on a gift from Ambrose Swasey, designed as the nucleus of an endowment from many donors. The report shows a number of researches conducted of interest to the electric railway industry. They include an investigation of arch dams, fatigue of metals and the beginning of an investigation of the application of paint on wood, known as the wood-finishing investigation, and the graphitic corrosion of cast iron. Reference is also made in the report of the Division of Engineering, National Research Council, of the study of rail joints in which the American Electric Railway Association is interested, as entering the stage of active experimental work.

Kansas Court of Industrial Relations

Bulletin No. 322 of United States Bureau of Labor Statistics. Department of Labor, Washington, D. C.

This is an account of the industrial court law of Kansas, and its working, throughout the period that it has been in effect. The report gives the text of the law, which passed in 1920, a synopsis of the cases filed on the industrial side of the court during 1920 and 1921 showing the methods and principles adopted by the court in its various actions, and an account of the legal proceedings arising in connection with the attendance of witnesses before the court and other activities of the court. A résumé is also is also given of the annual reports which have been published and a bibliography of books and articles relating to the court is appended.

Sampling and Analysis of Coal, Coke and Byproducts

Methods of the chemists of the United States Steel Corporation. Published by the Bureau of Instruction, the Carnegie Steel Company, Pittsburgh, Pa.

The chemists' committee of the United States Steel Corporation is made up of the chief chemists of laboratories of the constituent companies organized into groups. One of these is the coal, coke and by-products group. From time to time each group collects from all the laboratories the methods of analysis common to its particular products, and selects the best, the compilation being carefully edited and issued in pamphlet or book form by the Bureau of Technical Instruction of the Corporation. for distribution among the laboratories. Owing to the authoritative nature of these publications, there has arisen a considerable demand for them outside the corporation and they are sold at a reasonable price.

The most extensive of these publications relates to coal, coke and by-products. It is a leather-bound book of 190 pages. A second edition has recently appeared which is substantially a new work. The work divides itself into two parts, as indicated by the title, the more valuable from the electric railway standpoint being the first. This embraces the sampling of coal and coke, physical tests and proximate analysis of these, analysis of coal and coke ash, ultimate analysis of coal, determination of the calorific value of coal and coke, etc. Obviously this work should be in the library of every electric railway which does chemical analysis on fuels.

Experiments on Loss of Head in Valves and Pipes of One-Half to Twelve Inches Diameter

By Charles I. Corp and Roland O. Ruble. University of Wisconsin, Engineering Series. Vol. IX, No. 1. University of Wisconsin Engineering Experiment Station, Madison, Wis.

A 143-page pamphlet giving the data secured in an elaborate series of experiments on gate and globe valves. The experimental methods are described and the data are presented in graphical and tabular form. Deductions are drawn as to the significance of the experiments.

An Investigation of the Fatigue of Metals

Bulletin 136, Engineering Experiment Station, University of Illinois. By H. F. Moore, research professor of engineering materials, and T. M. Jasper, research assistant professor of engineering materials. Published by the University of Illinois, Urbana, Ill.

This investigation was carried on through the co-operation of the National Research Council, Engineering Foundation, the General Electric Company and the Engineering Experiment Station of the University of Illinois. Bulletin 124 of the Experiment Station contains the first report of the tests made in connection with the present investigation.

Tests were made on specimens of wrought ferrous metal, kept under continuous series of cycles of stress in reversed bending, combined reversed bending and steady tension, and reversed torsion. A study of the test data tends to confirm the existence of an endurance limit for wrought ferrous metals, that may be determined with a fair degree of accuracy by a short-time test. The endurance limit seems to be correlated with the ultimate tensile strength, with the Brinall hardness number, and in a much smaller degree with the yield point, and the proportionate elastic limit. Tests of specimens for various temperatures of "draw" after oil-quenching indicate that for carbon steel neither the ultimate tensile strength, the endurance limit for flexure nor the ductility was appreciably affected by draws at a temperature lower than 600 deg. F.

Legal Notes

Federal Courts—*Assessment Against Street Railway for Paving Held Not to Deny Due Process or the Equal Protection of the Laws.*

An assessment of $102,942.30 against a street railway for paving between, and for 18 in. outside, its tracks, as authorized by Pub. Laws N. C. 1915, c.56, on failure of the company to make the improvement, was not arbitrary or wholly unreasonable, so as to constitute a taking of property without due process of law or a denial of the equal protection of the laws, in violation of the Fourteenth Amendment, though the company's property on the street had a value of only $100,000, while abutting property, against which an assessment of $89,909.58 was made on a front-foot basis, had an assessed value of $5,083,250, and though the company was put to an expense of $75,108.85 in taking up and relaying its track, and though its railway was being operated at a loss. The franchise of the company required it to bring its roadbed and track to surface grade at its own expense when required, and while imposing no liability for paving, granted no exemption from it. (Durham Public Service Co. vs. City of Durham, 43 Supreme Court Rep. 290.)

Federal Courts—*Members of Trade Union Held Not Entitled to Recover Under Order of Court of Industrial Relations.*

Where the court of industrial relations of the state of Kansas found wages were unjust and adjudged that a minimum wage scale be in force from a certain date and be continued for six months, its order in effect was a finding that wages were not unjust prior to such date and subsequent to the date of service of the summons in the proceeding. Hence members of a labor union were not entitled to recover increased rate wages for the time between the service of the summons and such date, while the order of the Court of Industrial Relations continued. Decision by Circuit Court of Appeals, Eighth Circuit. [Local Union No. 497 of Amalgamated Association of Street & Electric Railway Employees of America et al. vs. Joplin & Pittsburgh Ry., 287 Federal Rep. 474.]

Georgia—*Grant of Right to Construct, When Accepted, Binds Company to Operate on Terms Stated.*

A franchise granted by the Board of County Commissioners specified the routes to be operated, schedule to be maintained, etc. After the line had been operated for a number of years the company decided to abandon a portion of it on the ground that its operation was unprofitable, but citizens along the line obtained an injunction against abandonment. The court held that the company could not abandon a portion of the line while retaining and operating another portion under the grant. So long as the company retains any of the benefits it must perform all the obligations imposed by the contract. [Macon Railway & Light Co. vs. Corbin et al, 116 Southeastern Rep. 305.]

Kansas—*Freight Charges for Transportation of Brick for Paving Purposes Not Lienable as for "Labor" or Labor Performed.*

The freight charges of a traction company for transporting certain carloads of brick to be used for the paving of public streets are not lienable claims as for labor within the meaning of the mechanic's lien act, nor do such freight charges fall within the terms of the bond which was given by the paving contractor to the city to secure the payment of all claims for labor which might be the basis of liens. [Union Traction Co. vs. Kansas Casualty & Surety Co., 213 Pacific Rep. 169.]

Michigan—*Statute Giving Court Jurisdiction to Order Reinstatement of Veterans Removed from Public Employment Is Unconstitutional.*

This case arose when a lineman in the employ of the Street Railway Commission of Detroit was discharged in November, 1920. As a veteran he brought suit for reinstatement and payment of wages during the intervening time because of the Michigan law which declares that no veteran shall be removed from a public office or employment except after a full hearing as to his competency before the Circuit Court of the county where he is employed. He was reinstated under writ of mandamus, but the court refused to adjudicate the matter of money due him. The Supreme Court declared that the constitution of Michigan defines the duties of the court as judicial, whereas if a court is to pass intelligently upon whether a person is suited for employment in public work, the inquiry is administrative in its character and not judicial. Hence the law is unconstitutional. [Koeper vs. Street Railway Commission of Detroit, 193 Northwest. Rep. 221.]

Missouri—*Liable for Conductor's Assault on Passenger Unless in Self-Defense.*

As assault by a railroad employee on a passenger is entirely excused only when the passenger's provocative conduct is such as in law amounts to a justification of the assault on the ground of self-defense, but where less than this, evidence of provocation is admissible in mitigation of damages only. [Hunter vs. Kansas City Rys., 248 Southwest. Rep. 998.]

New Jersey—*"Tracks" in a Paving Contract Meant Rails.*

Where a contract between a city and a street railway required the railway to pave that portion of the street "that lies inside of the rails of any of their tracks and 2 ft. outside thereof * * * and to keep certain parts of said streets so to be paved by them as aforesaid inside of their tracks at all times in good repair," the word "tracks" in this contract meant "rails." [City of Bayonne vs. Public Service Railway, 118 Atlantic Rep., 9.]

New Jersey—*Duty of Motorman in Approaching Street Intersection.*

The rule in regard to street intersections is that it is the duty of the motorman to have his car so far under control that he will not endanger the safety of a vehicle, driven with reasonable care, which may happen to cross the tracks in front of the trolley car. A request to charge that "a motorman must expect that other vehicles will cross his tracks at intersecting streets, and must keep his car under control in order to avoid collision at those streets," was properly denied. It was too broad, since it placed improperly the whole burden of avoiding a collision upon the motorman of the trolley car, without any regard to the recklessness of the driver of the other vehicle. [Geyer et al vs. Public Service Ry., 120 Atlantic Rep. 186.]

New York—*In Rate Fixing, Valuation at a Pre-War Basis, Less Depreciation, and Exclusion of Certain Overhead Expenses, Held Improper.*

In a valuation to determine rates, it was error to use pre-war costs, less subsequent depreciation, and not consider the valuation during and after the war. It was also error to exclude preliminary legal, administration and engineering expenses for building a 60 mile extension on the theory that this work had been done by the company's regular staff and charged to operating expenses because the way in which these expenses were defrayed in the past affects past earnings, which have nothing to do in determining whether the present rate is confiscatory. [People ex rel. New York State Railways vs. Public Service Commission, 195 New York Sup., 174.]

Pennsylvania—*Where a Passenger Transfers from One Car to Another He Must Look Out for Opened Doors.*

A passenger of a street car upon being requested to transfer to a car in the rear remains a passenger while walking from car to car. But where such a passenger walked so close to an intervening car that she was injured by the opening of door which protruded approximately 6 in., a directed verdict for defendant was warranted. The opening of the door itself was an entirely proper act, as the motorman was not bound to anticipate that a person would be walking within 6 in. of the car when there was a wide space beyond. [Swink et ux. vs. Philadelphia Rapid Transit Co., 120 Atlantic Rep. 827.]

Personal Items

William Walker With Shore Line

Former Hartford & Springfield Official Placed in Charge of Rehabilitated Property

Out of New Haven, Conn., there is now operating an electric railway which had long been shut down. It is the old Shore Line road, now under the management of William Walker. The road was conceived and constructed originally by the late Morton F. Plant. He saw a great future ahead for the territory skirting Long Island Sound between New Haven and New London, but before the road could be made to pay Mr. Plant died.

While he lived Mr. Plant's money was his own to do with as he liked. After he died there was another story. The executors of his estate promptly set about the work of cutting off ventures of his that had become a liability In this process the part of the Shore Line System previously referred to was shut down. And it remained shut down until July 17 of this year. On that date service was resumed under the direction of Mr. Walker by a new company, the New Haven & Shore Line Railway, headed by William A. Sperry, New Haven, and associates, no less enthusiastic about the possibilities of the road in the future than was Mr. Plant. They have opened the road from New Haven to Guilford and propose to extend operation soon from Guilford to Saybrook, 33 miles from New Haven.

The original road was well built, largely on its own private right-of-way. So far as the engineering work in connection with its rehabilitation was concerned the problems that presented themselves for solution were easy. The real questions were how to equip the road and how to run it so that the public might be served adequately and a profit made for the new owners. This is the problem that is now up to Mr. Walker. Nearly all his experience has been with roads confronted with problems somewhat similar to that now presented by the rehabilitated Shore line. He was formerly general manager of the Hartford & Springfield Street Railway, Warehouse Point, Conn., and for eight years before that he was superintendent of the Southbridge division of the Worcester (Mass.) Consolidated Street Railway.

He entered railway work as a conductor on the Schenectady Street Railway in 1894 and later served that company as inspector. His service with that company covered a period of ten years. He next was appointed a train dispatcher with the Berkshire Street Railway and a year later was transferred by that company to Westfield as an inspector of construction on the Western Massachusetts Street Railway. When the Western Massachusetts was placed in service Mr. Walker was appointed an inspector of transportation. He was next transferred from Westfield to Springfield in a similar capacity and later was made superintendent of the Blackstone Valley division of the Worcester Consolidated Street Railway. He was made superintendent of the company's Southbridge division in 1912. Other men there are with experience similar to that of Mr. Walker, but probably few with a wider range of experience than he in handling problems such as will undoubtedly be presented for settlement in connection with the operation of the Shore line and certainly very few, if any men, with a keener knowledge of the needs of the people of the territory served by the rehabilitated road.

William Walker

A. C. Starkey Heads Railway Division—W. L. Clayton in Charge of Buses

Several changes in the personnel of the transportation department of the Indiana, Columbus & Eastern Traction Company were announced on Aug. 1 by C. C. Fast, general superintendent of transportation, from his offices in Springfield, Ohio.

Arthur C. Starkey, superintendent of the Springfield-Lima division, was placed in charge of all traction line operations on the Dayton-Columbus; Dayton-Union City, and Springfield-Lima divisions.

W. L. Clayton, formerly superintendent of the Dayton-Columbus division, will have control over all bus operations on the Dayton-Columbus and Springfield-Lake View divisions.

R. L. Jacobs, who has been superintendent of all bus lines of the Indiana, Columbus & Eastern Company, was transferred to Columbus to direct bus operations between Columbus and Grove City, and all bus operations of the Columbus and Zanesville line. He will serve under John W. Hewitt, general superintendent of the Columbus, Newark & Zanesville Electric Traction Company.

C. O. Strait, former dispatcher at Springfield, is stationed at Dayton as inspector in charge of Dayton freight operations and the Dayton-Union City traction division.

The placing of all bus operations on the I., C. & E. divisions under the direction of Mr. Clayton, Mr. Fast announced, is in recognition of the importance of this phase of the company's activities and also because under the new Freeman-Collister bus law, the bus is placed on a new status as an agent of transportation, "the company being fully awake to the possibilities of the situation."

W. R. Johnson has been appointed superintendent of the railway properties of the Menominee & Marinette Light & Traction Company, Menominee, Mich. He will succeed J. I. Searles, who lately left the company to become connected with the Lake Superior District Power Company's railway lines. Before taking up his new duties, Mr. Johnson was connected with the Wisconsin Public Service Corporation's railway and interurban lines in and near Green Bay. Before becoming associated with the Wisconsin Public Service Corporation, he was with the Chicago, Milwaukee & North Shore Railway in Milwaukee.

William Dineen, Madison, was appointed secretary of the Wisconsin Railroad Commission to succeed C. D. SeCheverell, who resigned to accept a position with the Middle West Utilities Company at Grand Island, Neb., as head of the utility company there. Mention was made of Mr. SeCheverell's resignation in the ELECTRIC RAILWAY JOURNAL issue of Aug. 4. For the past sixteen years Mr. Dineen has been connected with the commission, starting as office boy. For the past five years he has been chief clerk, a post in which he was called upon to do much commission detail work.

E. F. Schneider is back at work. His many friends will be glad to know that he is sufficiently recovered from his long and serious illness so that he can again undertake some work though limiting his responsibilities. It will be recalled that Mr. Schneider was formerly vice-president and general manager of the Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio, and was most active in railway circles. He had to give up his connection with the Cleveland & Southwestern early in 1921 on account of his illness. At present he is doing some work in the claim department of the Cleveland Railway. He attended the summer meeting of the Central Electric Railway Association held recently at Cedar Point and was welcomed back by his many friends in this territory. He was president of the Central Electric Railway Association 1914-1915.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Coal Crisis Imminent

Strike in Anthracite Field May Be Followed By Sympathetic Bituminous Strike—Coal Commission Reports

A very serious situation exists in regard to the coal supply. This fact is set forth in a letter sent under date of Aug. 7 to the member companies of the American Electric Railway Association. According to this circular letter, signed by J. W. Welsh, secretary, many people regard a strike on Sept. 1 in the anthracite coal field as inevitable. They predict that a sympathetic strike in the bituminous field may follow.

It is stated that the American Electric Railway Association is co-operating with the Joint Fuel Committee under the chairmanship of John W. Lieb, and every possible assistance will be rendered to the member companies. "We cannot urge too strongly," states the latter "that all electric railway managements take immediate steps toward increasing their fuel supplies to the maximum of storage capacity. The time to begin is now."

President Coolidge in Conference

What steps, if any, the new administration plans to take in order to avert a tie-up are unknown. A conference between President Coolidge and a representative of the Federal Coal Commission has been held, however, and the President is thoroughly conversant with the situation. It is understood that he firmly indorses the report of the commission.

The anthracite wage agreement expires on Sept. 1. After four weeks of conference at Atlantic City between representatives of the United Mine Workers and the anthracite operators, all negotiations have been called off. The particular cause of the deadlock was the miners insistence upon the check-off and the refusal of the operators to grant it. It is declared that John L. Lewis, president of the United Mine Workers, will insist upon the granting of the check-off or will call a strike. It is further stated that anthracite operators will make no effort to break a strike should one be declared by the men.

Bituminous wage agreements include the check-off and the funds received from it would go to help finance strikers in the anthracite field. It is upon this fact that prediction of a sympathetic strike by the miners in the bituminous field is based.

Report of the Commission

The United States Coal Commission made public on Tuesday, Aug. 7, a supplemental report on labor conditions in the anthracite industry, containing twelve recommendations for bringing about peace. The recommendation that the President should have the right by law to prevent a coal strike is in line with the previous recommendation of this body. Compulsory arbitration is declared to be no remedy. The check-off which is one of the outstanding issues in the present controversy is not mentioned in the report. Both sides are again condemned for the loose and misleading statements which they have given to the public. Other recommendations made in the report are very similar to those contained in the preliminary report of the commission published in ELECTRIC RAILWAY JOURNAL for July 14, page 56.

$1,000,000 Contract Awarded by Ford's Road

Preparations are now under way for the electrification of the first unit of the Detroit, Toledo & Ironton Railroad. Contracts aggregating $1,000,000 have been awarded to the Westinghouse Electric & Manufacturing Company for the construction of equipment and rolling stock. The original capacity of the Rouge power house is being doubled. The present two 12,500-kw. turbo-generators are being replaced by eight turbo-generators of 30,000 kva. capacity each. One of these turbines is already nearing completion.

The electric locomotives will weigh 350 tons. They will have a normal capacity of 4,000 hp., and a one hour capacity of 5,000 hp. Sixteen driving axles will develop 108,000 pounds drawbar pull at 25 m.p.h. The maximum speed will be 45 h.p.h.

In addition to the rehabilitation of the power plant and the construction of locomotives, 13¼ miles of double track will be built between the River Rouge plant and the Flat Rock yards. Many other minor improvements are contemplated.

It has been Mr. Ford's goal from the first to electrify the road. Many rumors to this effect have been current in the past, but the first official announcement of them was made in the "D. T. & I. News" recently as noted in the ELECTRIC RAILWAY JOURNAL for July 28, page 153.

Thirty-Year History Compiled

A review of thirty years' history of the General Electric Company, from its foundation in 1892 to 1922, is made the subject of a thirty-four-page booklet just issued to the company's stockholders. Tracing the development which grew out of the early pioneering work of the Edison General Electric Company, and the Thomson-Houston Electric Company, the growth of the business and the constantly widening application of electric power are pictured.

The following are the principal headings: "Large Scale Power Generation," "Power on the Sea," "The Trackless Trolley," "At the Panama Canal," "Contributions to Long-Distance Wireless Communication," "Lightening Home Burdens," "Far-Reaching Aid to Medical Science," "Progress in Illumination," "A Great Necessity at a Small Expense," "One Million Volts," "Prices Increased Less than the Average," "How G-E Money Is Spent," "Opportunities for the Future."

Overproduction of Oil

It was recently announced that many oil refineries in the mid-continent field intended to suspend operations during a period of several weeks. The principal wells of this field are located in the bordering states of Texas, Oklahoma and Kansas.

An unprecedented surplus now existing was given as the reason for this move. Rather than suffer a price reduction which would make it impossible to sell at a profit the refiners discussed the idea of shutting down their plants until the surplus had been absorbed. So far as is known, no effort has yet been made to carry out this move. It is felt that Government intervention might occur in case the attempt were made.

Although a somewhat general condition of overproduction exists, many of the large oil companies are taking no part in this proceeding. For several months past the capacity of the pipe lines and the storage capacity at tidewater has been severely taxed. For this reason there has been little attempt made to drill new wells. It has been thought better to hold back until the present supplies have been further absorbed.

In any case, lubricating oils probably will be little affected. Many of these oils are made from a Pennsylvania paraffine base and a shutdown on account of overproduction in the mid-continent field would have no bearing upon the situation in the Pennsylvania oil field.

Metal, Coal and Material Prices

Metals—New York	Aug. 7, 1923
Copper, electrolytic, cents per lb	14.312
Copper wire base, cents per lb	17.125
Lead, cents per lb	6.525
Zinc, cents per lb	6.50
Tin, Straits, cents per lb	38.375
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$5.375
Somerset mine run, Boston, net tons	2.625
Pittsburgh mine run, Pittsburgh, net tons	2.075
Franklin, Ill., screenings, Chicago, net tons	1.65
Central, Ill., screenings, Chicago, net tons	1.375
Kansas screenings, Kansas City, net tons	2.625
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	$7.00
Weatherproof wire base, N. Y., cents per lb.	18.75
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N. Y., per gal	$1.02
White lead, in oil (100-lb. keg), N. Y., cents per lb	11.85
Turpentine, (bbl. lots), N.Y., per gal	$0.95

Rolling Stock

Danville Traction & Power Company, Danville, Va., has received five sets of Taylor reduced height trucks equipped with Taylor straight action brakes for use on its new cars.

Augusta-Aiken Railway & Electric Corporation, Augusta, Ga., is expecting delivery this month on the fifteen special safety cars which were ordered in March from the Perley A. Thomas Car Company of High Point, N. C. For these new cars the Taylor Electric Truck Company has made a shipment of its reduced height trucks with Taylor straight action brakes.

Georgia Railway & Power Company, Atlanta, will expect delivery next December of the twenty cars ordered several months ago. The specifications of these cars are as follows:

Builder of car body	Georgia Railway & Power Company
Type of car	Closed
Seating capacity	48
Total weight	37,000 lb.
Bolster centers, length	20 ft. 6 in.
Length over all	44 ft. 6 in.
Truck wheelbase	5 ft. 4 in.
Width over all	8 ft. 3 in.
Height, rail to trolley base	12 ft. 2 in.
Body	Steel
Headlining, Roof	Arch
Air brakes	Westinghouse-DH 16 Compr.
Armature bearings	Sleeve
Axles	4 in., heat treated
Bumpers	Channel
Car signal system	Consolidated
Car trimmings	Dayton Manufacturing Company
Center and side bearings	McGuire-Cummings
Conduits and junction boxes	Metal
Control	G-E., PC. 5
Couplers	Tomlinson, Form 10
Curtain fixtures	Curtain Supply Co.
Curtain material	Pantasote
Designation signs	Keystone
Door operating mechanism	Manual
Fare boxes	None
Fenders or wheelguards	Atlanta—Similar to H-B
Gears and pinions	G-E, Grade M.
Hand brakes	Ackley, Staffless
Heater equipment	Consolidated
Headlights	Golden Ray & Golden Glow
Journal boxes	McG., MCB
Lightning arresters	Aluminum Cell
Motors, type and number	4-GE—265-A
Motors, outside or inside hung	Inside
Paint	Paint and varnish
Registers	Ohmer
Sanders	O-B
Sash fixtures	Dayton Manufacturing Company
Seats	Hale & Kilburn
Seating material	Rattan Filled
Slack adjuster	American
Step treads	Kass & Feralun
Trolley catchers or retrievers	O-B
Trolley base	O-B, Form 1
Trolley	Wheel
Trucks	McGuire-Cummings Company
Ventilators	Nichols-Lintern
Wheels (type and size)	26 in. Cast. chilled

Louisville Railway has announced the specifications for the fifteen new cars and twenty-five trailers recently ordered and mentioned in these columns previously. The detailed specifications of the cars follow:

Date order was placed	July 5, 1923
Date of delivery	Nov. 1-15, 1923
Builder of car body	G. C. Kuhlman Car Co.
Type of car	Peter Witt D.Ent. D.Exit. Double Truck Four Motor
Seating capacity	46
Total weight	36,900 lb.
Bolster centers, length	22 ft. 6 in.
Length over all	45 ft. 1¾ in.
Width over all	8 ft. 2 in.
Body	All steel
Interior trim	Birch
Headlining	Agasote
Roof	Arch
Air brakes	Westinghouse, T. B. Co. Straight
Bumpers	Angle iron
Car signal system	Consolidated Car Heating Company
Center and side bearings	Brill
Control	G.E. "K"
Couplers	Tomlinson No. 6
Curtain fixtures	Curtain Supply Company
Curtain material	Pantasote
Designation signs	Dash signs only
Door operating mechanism	National Pneumatic Company front platform, hand-operated center.
Fenders or wheelguards	Louisville Railway Company
Fare boxes	Louisville Railway Company
Gears and pinions	General Electric Company
Hand brakes	Quick release, ratchet handle
Heater equipment	Cutler-Hammer Company
Headlights	Ohio Brass Company
Journal bearings	Plain
Journal boxes	Brill
Lightning arresters	General Electric Company
Motors, type and number	4-G.E. 247-I
Motors, outside or inside hung	Inside
Paint	Enamel
Registers	International Register Company
Sanders	Ohio Brass Company No. 13,797
Sash fixtures	Edwards
Seats	Brill
Seating material	Wood Slat
Springs	Brill
Step treads	Feralum
Trolley catchers or retrievers	Ohio Brass Company
Trolley base	General Electric Company
Trucks	Brill
Wheels	26-in. F. C. S. Griffin

The specifications of the trailers are as follows:

Date order was placed	July 5, 1923
Date of delivery	Nov. 10-30, 1923
Builder of car body	G. C. Kuhlman Car Company
Type of car	Center entrance; pay as you pass
Seating capacity	60
Total weight	25,000 lb.
Bolster centers, length	23 ft. 7¼ in.
Length over all	46 ft. 8¾ in.
Width over all	8 ft. 2 in.
Body	All steel
Interior trim	Birch
Headlining	Agasote
Roof	Arch
Air brakes	Westinghouse T. B. Company
Bumpers	Angle iron
Car signal system	Consolidated Car Heating Company
Couplers	Tomlinson No. 6
Curtain fixtures	No curtains
Designation signs	None
Door operating mechanism	Hand operated
Fare Boxes	Louisville Railway Company
Fenders or wheelguards	Louisville Railway Company
Gears and pinions	G E.
Hand brakes	Quick release, ratchet handle
Heater equipment	Cutler-Hammer
Headlights	O. B.
Journal bearings (if ball or roller)	Plain
Journal boxes	Brill
Lightning arresters	G.F.
Paint	Enamel
Registers	International Register Company
Sanders	O. B. Company
Sash fixtures	Edwards
Seats	Brill
Seating material	Wood Slat
Springs	Brill
Step treads	Feralun
Trucks	Brill
Ventilators	Brill
Wheels (type and size)	26-in. F. C. S. Griffin

Track and Line

Elmira Water, Light & Railroad Company, Elmira, N. Y., has been engaged in an extensive program of track reconstruction. The plan includes new track and paving on east and west Miller Streets, Maple Avenue, west Third Street and Railroad Avenue and south Main Street.

Capital Traction Company, Washington, D. C., will soon start work improving the old car line from Chevy Chase Lake to Kensington. Under the lease by which the Kensington Railway passed into the hands of the Capital Traction Company it was agreed that the leasing company would improve the roadbed and operate modern cars over it.

Altoona & Logan Valley Electric Railway, Altoona, Pa., has started work on the construction of 2 miles of double-track. About $40,000 will be spent. The company will extend the double track from Ramey's to Ale's station, 1.3 miles and from Buena Vista to Tipton, a distance of 1 mile. The division has double track at present from East Altoona to Ramey's, a distance of 3 miles. A contract has been awarded to E. L. Grannas for excavation and filling in work necessary for the second track. The trolley company is doing the track laying work. Thirty foot "T" rails are being used. This construction is in line with the company's expectation that patronage will increase through the construction of the $250,000 board automobile speedway at Tipton.

Power Houses, Shops and Buildings

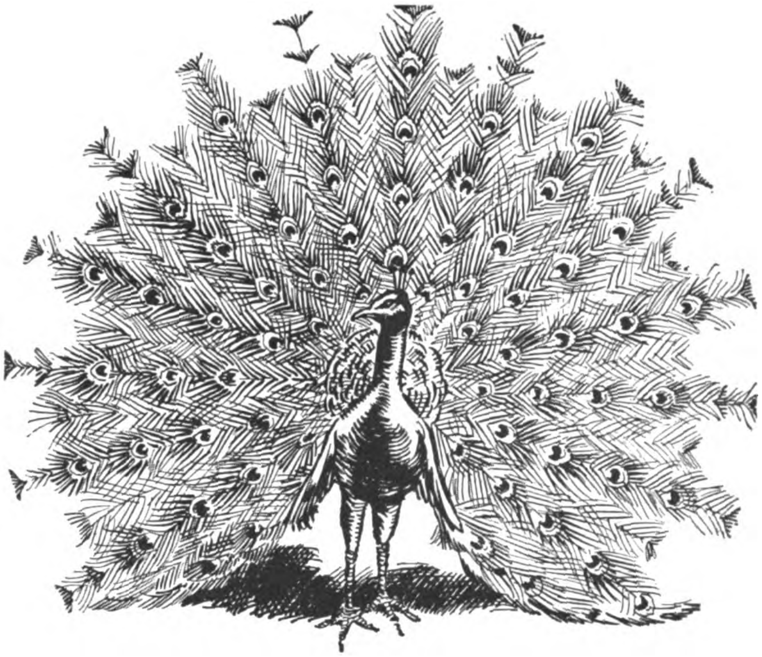
Trenton & Mercer County Traction Corporation, Trenton, N. J., will purchase a plot of ground on East State Street between Cuylet and Walter Avenue, and erect a carhouse there. Permission has been obtained to use the plot for a carhouse.

Sioux City Gas & Electric Company has postponed the construction of the proposed $3,000,000 power plant which was to have been completed and ready for operation in 1924. High prices of material and equipment are the reasons for deferring this construction.

Georgia Railway & Power Company, Atlanta, has ordered one 3,000-kw. 600-volt d.c. motor-generator set and switchboard for the Stewart Avenue substation. The coal and ash-handling equipment and automatic stokers for the Davis Street plant and Butler Street plant have already been ordered.

Philadelphia Rapid Transit Company will soon start on its building program which in addition to the new southern carhouse includes the construction of new and modern shops on Tenth Street and Erie Avenue. The new southern carhouse will be located on the property acquired by the company from the Girard Estate lying between Nineteenth and Twentieth Streets, Moyamensing Avenue and Johnson Street. It will accommodate more than 400 cars and will cost about $1,300,000.

Olean, Bradford & Salamanca Railway, Olean, N. Y., will soon move its office and waiting room from the head of Main Street, in Bradford, to the Erie Railroad depot there. With the removal of the offices, the work will be started on the installation of a switch on to the tracks of the Erie which will make the railroad depot the terminus of the traction lines. This change will help in relieving the congestion along Main Street, by diverting all freight cars on to the railroad tracks and leaving the depot for loading and unloading of freight cargoes. This move is part of the retrenchment policy of the company.



An excuse is almost an admission of guilt—

When the question of brakes is raised at the inquiry!

The air brake failed, that is evident, but what about the emergency brake?

On the answer to that question hangs rather more than the monetary side of the case. Adverse criticism means a serious loss of goodwill. There is no more excuse for having obsolete or inadequate emergency equipment on passenger cars than there is for putting up a building without a fire escape.

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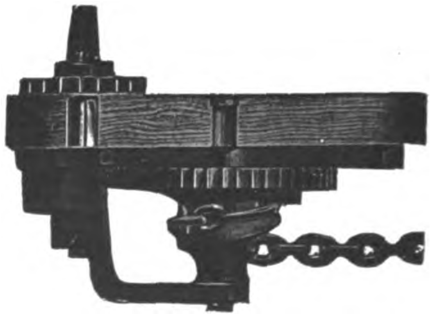

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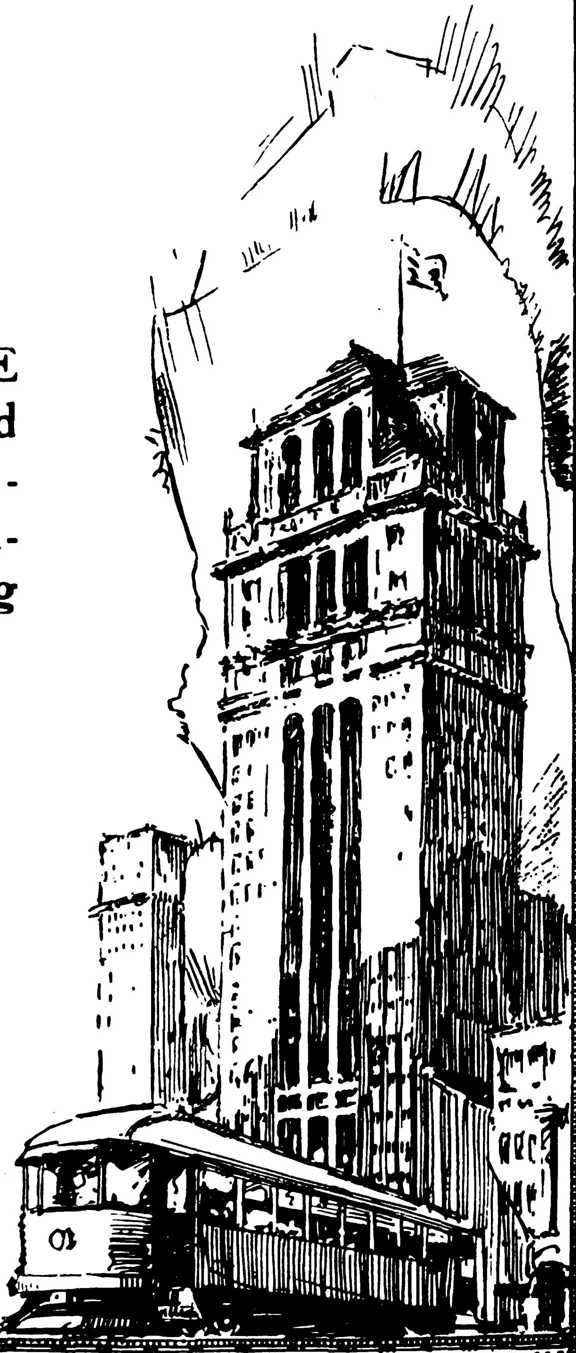

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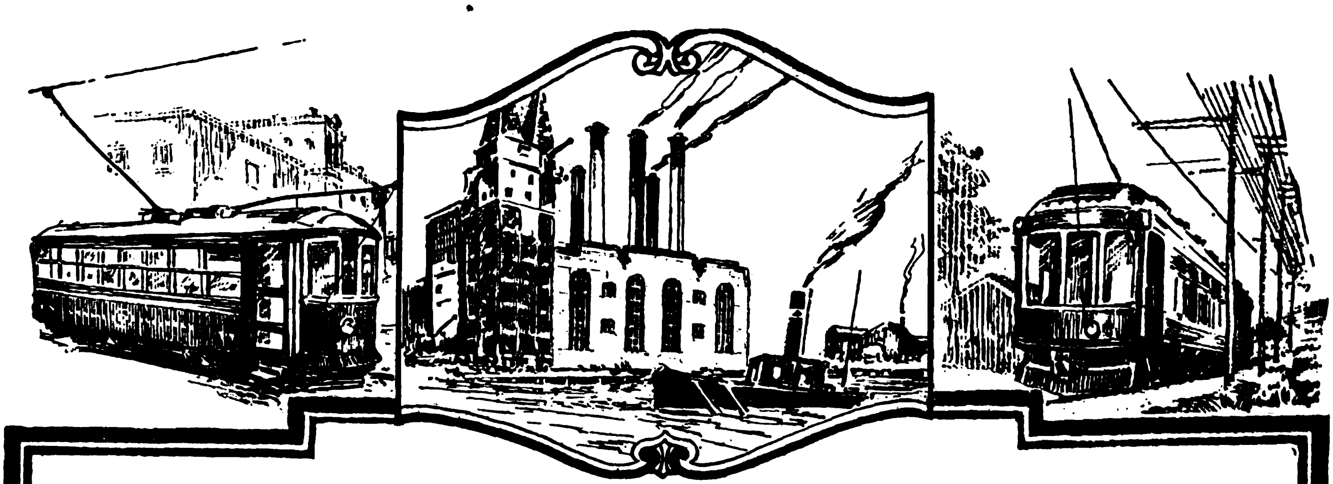

DAY AND NIGHT

These Lamps Are Burning

IN A ROOM in one of the TEXACO Laboratories several scores of various kind of lamps and lanterns are kept burning continuously.

Sometimes for hours they burn in solitude—no one goes near them.

Then, for a few minutes, they are subjected to the rigorous scrutiny of busy scientists.

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These lamps are used to shed a light on the question of right burning oil for street railways. TEXACO has conducted long-time burning tests.

We have checked the performance of various oils under particular operating conditions. We have studied the various factors of different types of burners, different shapes and kinds of wicks, different uses, and the different characteristics of the oils which these uses require.

This background of study, experiment and test is behind the TEXACO Engineer when he recommends any of our burning oils for your hand lanterns, switch lights, tail lights, or whenever you use oil for illumination.

He knows burning oils from experience, just as he knows lubrication from the experience gathered in the hundreds of millions of car miles made with TEXACO lubricants.

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A compounded oil of excellent quality especially noted for its long burning and its regularity of flame.

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A mineral oil for Hand Lanterns, Stationary Lamps and Tail Lights

A clean oil which burns with a clear, even glow, especially desirable for its safety factor—High Flash.

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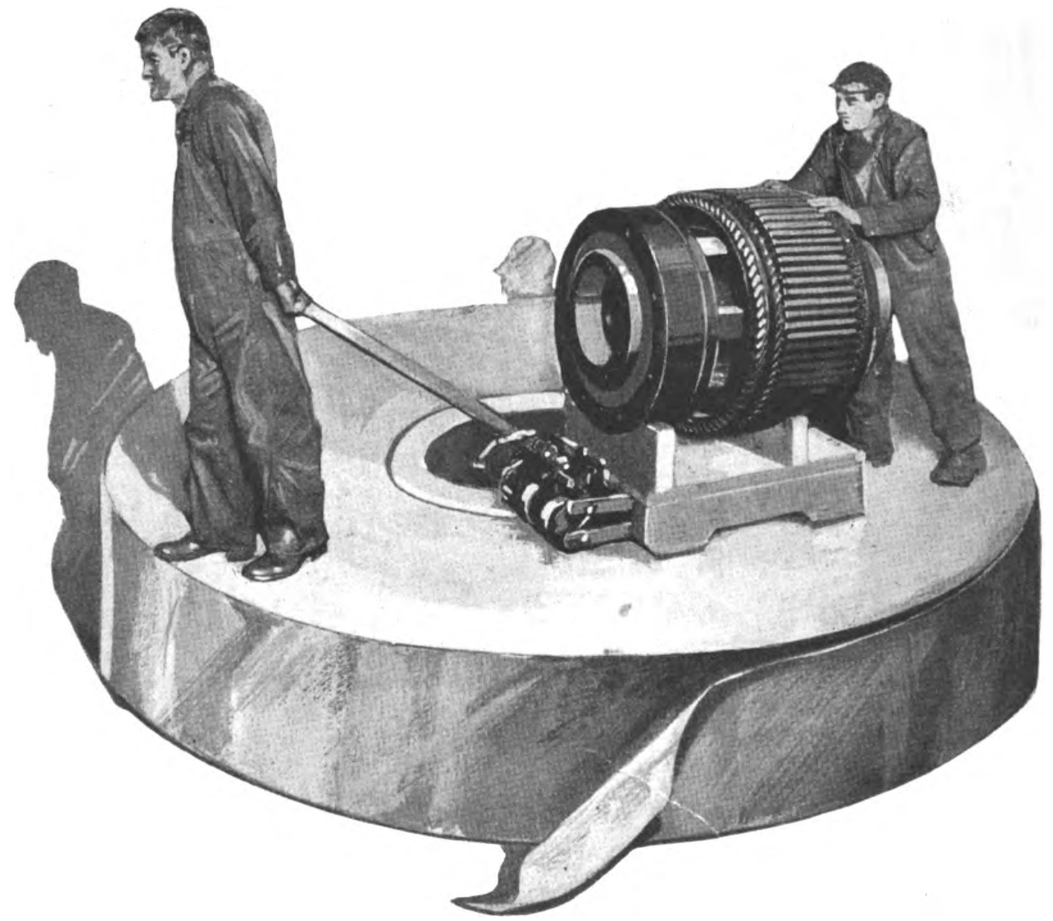

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It is not enough that today the majority of high tension insulated wires and cables in the United States are protected by Irvington Black Varnished Cambric.

But when we say that in comparison with other insulation, Irvington Black Varnished Cambric has 30% higher dielectric strength; 100% better heat resistance; 100% more alkali and acid resistance; 200% better aging qualities; 200% more resistance to oil than yellow varnished cambric, no further explanation of the foregoing facts is necessary.

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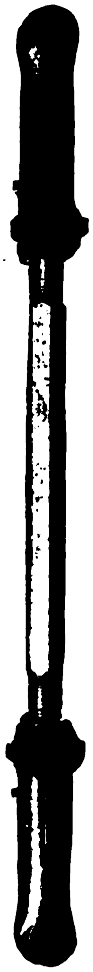
The McArthur Turnbuckle



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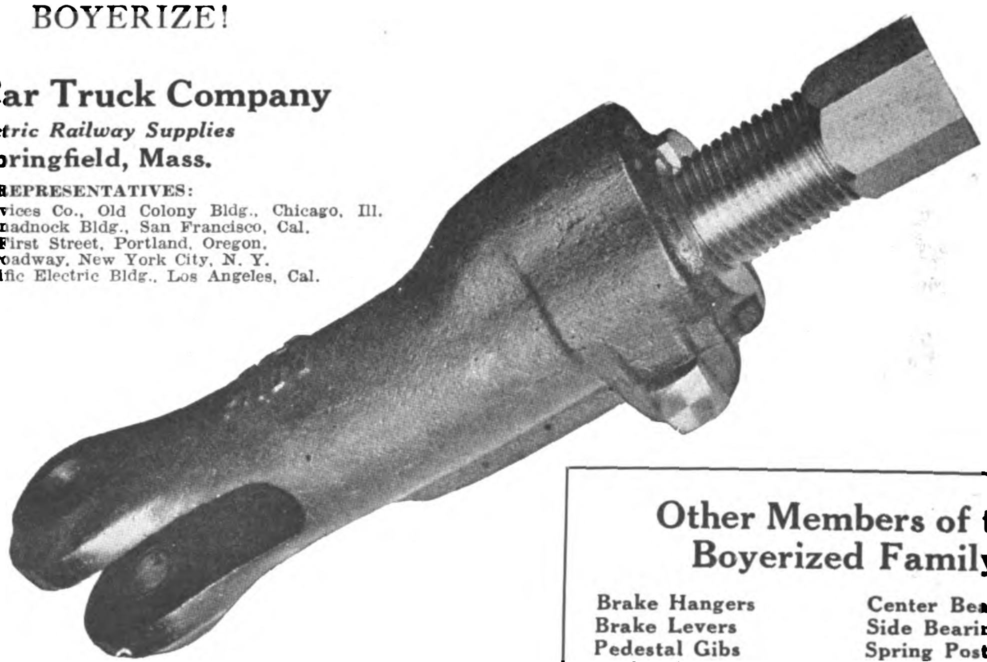

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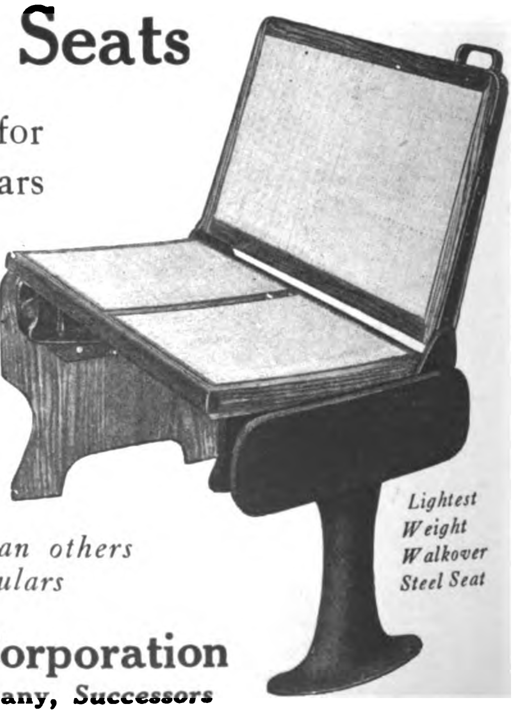

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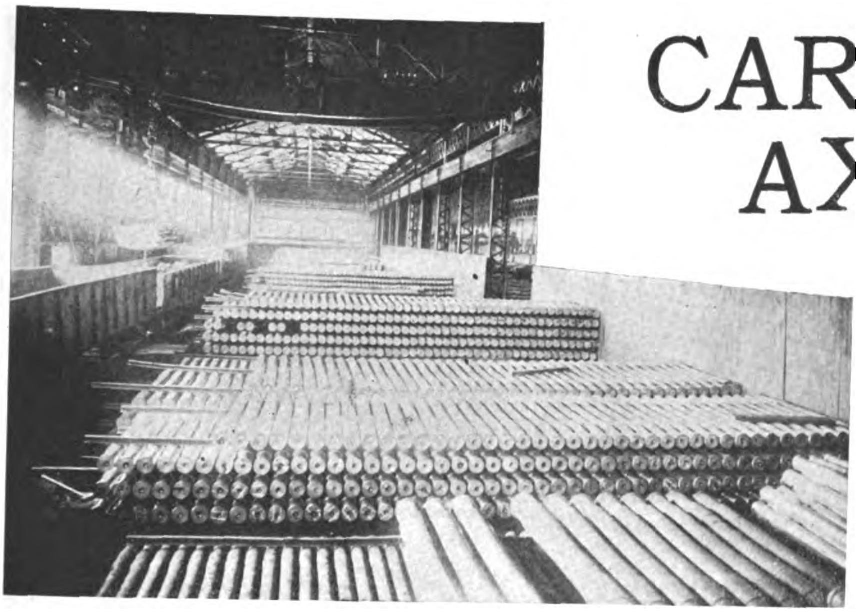

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For over half a century Carnegie Steel Company has engaged in the manufacture of axles.

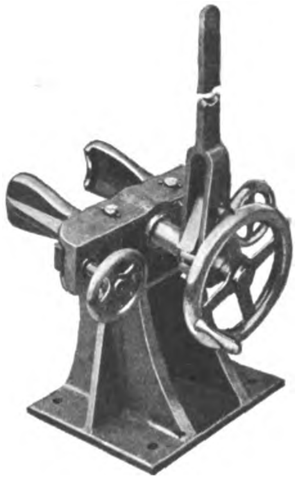
The extensive facilities of this company for proper heat treatment and accurate testing make us confident we can serve you to your best advantage.

Your inquiries will receive prompt attention.

Carnegie Steel Company

GENERAL OFFICES: CARNEGIE BUILDING, PITTSBURGH, PA.

1549



The COLUMBIA Pinion Puller

Will remove pinion from any armature shaft in one minute with proper operation.

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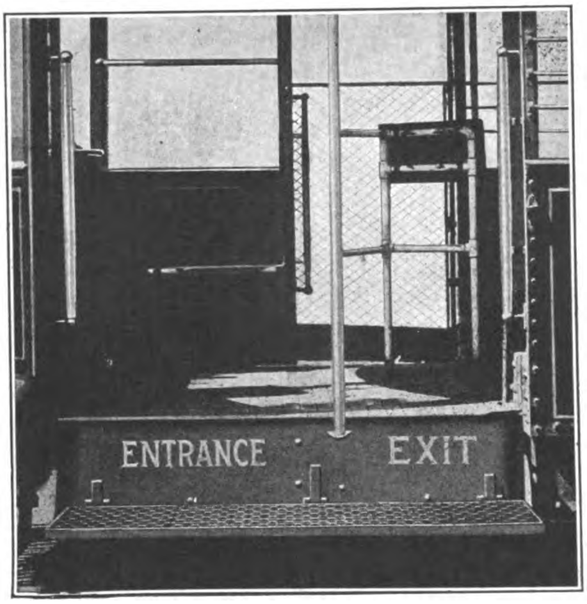
THE FIREPROOF VENTILATING FLOORING

A Clean Step, as Well as Safe



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TRADE MARK
(PATENTED) REG. U.S. PAT. OFF.
ABSOLUTELY NON-SLIPPING ALWAYS

Safety, of course, is the big feature of the **Safstep.** But it is a clean step, too. It won't accumulate dirt and fill up. It makes a good foot-scraper. Mud, dirt and dust fall through the open spaces—instead of being tracked into the car. And water, snow and ice do not impair its non-slipping surface which is an inherent feature of the **Safstep** itself. Let us send Catalog 3A-28.

IRVING IRON WORKS CO.
LONG ISLAND CITY. N.Y., U.S.A.

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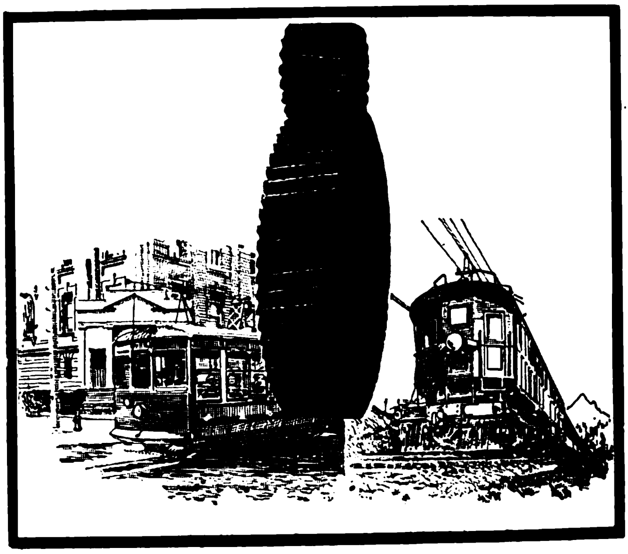
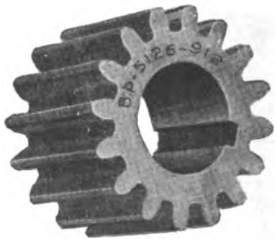


In every field of electric traction service, from one man safety cars to interurban fliers and trunk line locomotives, Nuttall Helical BP Gears and Pinions are every day proving that they cost one-half less than any untreated spur gears.



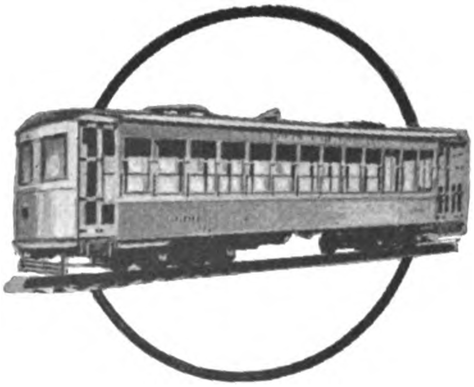
R.D. NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

Nuttall

A car in sight settles the "walk or ride" question

"Oh, it's only a few blocks — quicker to walk." That's the argument of the busy man, who sees no car in sight, when he hops to the corner. Thousands like him will ride if they get better service.



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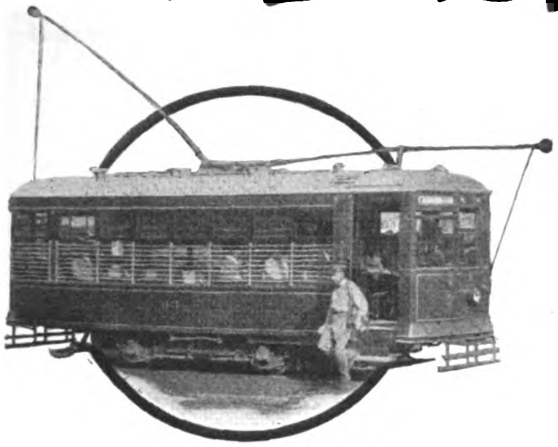
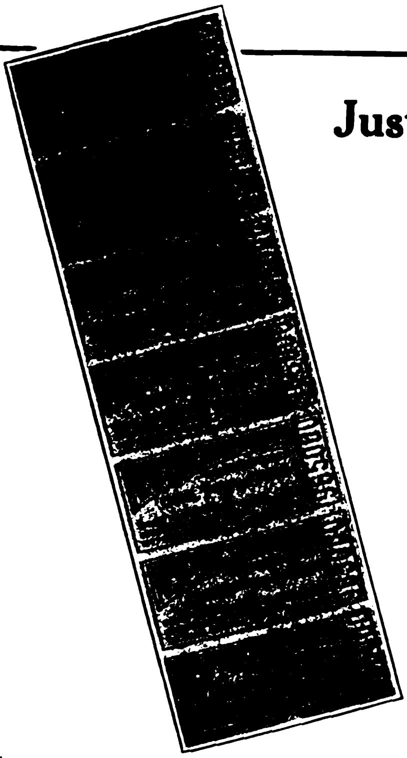


And good service is more a matter of right equipment than of cost. St. Louis Safeties, either double-truck or single-truck, have the speed and economy which make a "car-in-sight" policy possible without appreciable increase in operating cost.

Ask us for the figures before buying new cars.

St. Louis Car Company
St. Louis, Mo.
"The Birthplace of the Safety Car"



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The term Globe Tickets does *not* mean a kind of ticket you buy, and then make your system fit it as well as you can— Far from it!

Globe Tickets are made to fit your system, fill your requirements, and take care of the conditions on your road. Globe Tickets, and P. M. Coupon Transfers are the standard of many Electric Railway Companies in all parts of the country.

Tell us your needs, and we will help you make tickets to fit them.

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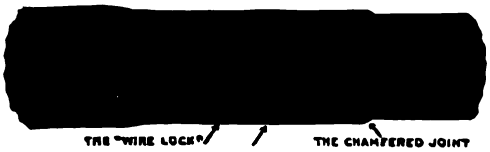
ELRECO TUBULAR POLES



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Lowest Cost Lightest Weight
Least Maintenance Greatest Adaptability
Catalog complete with engineering data sent on request
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Headway Recorders
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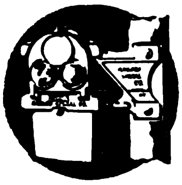

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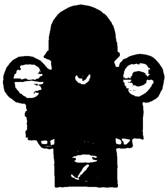

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AUTOMATIC SIGNAL
for single track block signal protection
United States Electric Signal Co.
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Shaw Lightning Arresters
Standard in the Electric Industries
for 35 years
Henry M. Shaw
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Plant—Texarkana Beaumont Galveston
MONEY SAVERS TO RAILWAYS
Treated railway ties, poles, piling,
bridge timbers, etc.
See our full page advertisement
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Products
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THE OKONITE CO., Passaic, N. J.
Incorporated 1884
Sales Offices: New York—Atlanta—San Francisco
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Are made to meet every requirement. Galvanized the Hubbard Way.

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High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
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SPECIALISTS
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Standard—Insulated—and Compromise Rail Joints

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Lorain Special Trackwork Girder Rails

Electrically Welded Joints

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Builders since 1868 of Water Tube Boilers of continuing reliability

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An automatic dump car, an electric locomotive, a snow plow, and a freight car—all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation.

The Differential Steel Car Co.
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Special Trackwork
For Street and Steam Railways

Steel Castings Gas Cylinders

ORIGINATORS OF
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We make a specialty of
ELECTRIC RAILWAY LUBRICATION
We solicit a test of TULC on your equipment
The Universal Lubricating Co.
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"Make it of Vul-Cot Fibre"

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Manufacturers of
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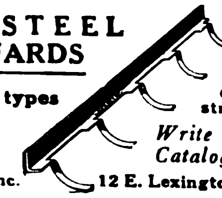
Adapted to all types of rails and paving.
W. S. GODWIN CO., Inc.



Proven by service to economically prevent seepage and disintegration of street railway paving.
Write for Illustrated Catalog No. 20.
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RAMAPO AJAX CORPORATION
Ramapo Automatic Return Switch Stands for Passing Sidings
RACOR
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RACOR Tee Rail Special Work.
Manganese Construction
GENERAL OFFICES: HILLBURN, NEW YORK
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Takes 1200 people to publish them

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F-4

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Fit the Fare and Fare Collection System

The Cleveland Fare Box Co.
Cleveland, Ohio

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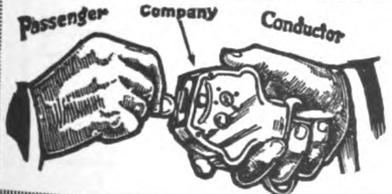

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Rooke Automatic Register Co.
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Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

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OHMER Fare Registers

The indication and registration of the amount paid are featurers inseparable from successful retail merchandising.

Ohmer Fare Registers apply these essential features to the sale of electric railway transportation.

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Made in various types and sizes to meet the requirements of service on street and city system. Complete line of registers, counters and car fittings.

Exclusive selling agents for HEEREN ENAMEL BADGES.

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Trade Mark Reg. U. S. Pat. Off.
Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED

No. 478E

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Car Seat and Snow Sweeper *Rattan*

For 60 years we have been the largest importers of rattan from the Far East. It is therefore to be expected that when Rattan is thought of, our name, "Heywood-Wakefield," instantly comes to mind.

Follow that impulse and write us when in the market for:

High Grade close woven Rattan Car Seat Webbing, canvas lined and unlined, in widths from 12 in. to 48 in.

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High Grade Car Seats, cross or longitudinal, covered with Rattan, Plush or Leather.

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Railway and Power Engineering Corp., Toronto and Montreal
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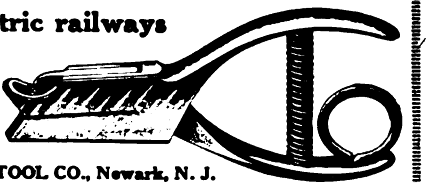

75% of the electric railways
use
B-V Punches

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A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

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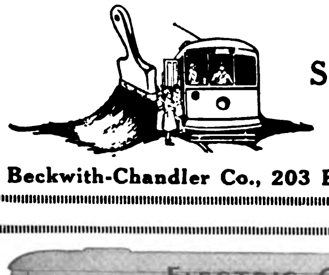

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Sells Transportation

Let our experts on railway car finishing demonstrate Beckwith Chandler paints and varnishes. Write for details.

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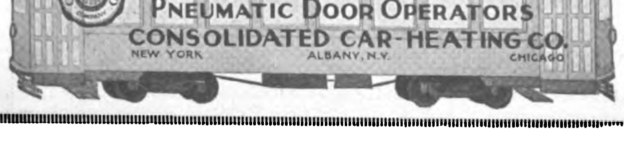

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When you want **Men**

put your advertising for them on the same basis as other publicity.

If you want competent and efficient assistants, experienced in the field served by this journal, you will naturally find such men among our readers—which include the keenest and most progressive men in the industry.

Get in touch with a number of these men and select the one that is best suited for your needs.

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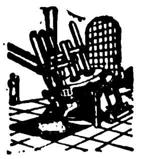
BUCKEYE JACKS

high-grade R. R. Track and Car Jacks

The Buckeye Jack Mfg. Co.

Alliance, Ohio



MOORE RAPID **'LECTROMELT** FURNACES

MAKE YOUR OWN STEEL AND IRON CASTINGS WHEN AND AS YOU NEED THEM

PITTSBURGH ELECTRIC FURNACE CORPORATION

Largest Maker of Arc Furnaces in the World

PITTSBURGH, PA.

RAILWAY UTILITY COMPANY

Sole Manufacturers
"HONEYCOMB" AND "ROUND JET" VENTILATORS for Monitor and Arch Roof Cars, and all classes of buildings; also ELECTRIC THERMOMETER CONTROL of Car Temperatures.

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Chicago, Ill.

Write for Catalogue

1328 Broadway
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N-L VENTILATORS

The N-L New Style Type "C" Ventilator is absolutely weatherproof, lies low on the roof, looks well and meets every requirement of ventilation.

THE NICHOLS-LINTERN COMPANY

7960 Lorain Ave., Cleveland, Ohio.
N-L Products manufactured and sold in Canada by
Railway and Power Engineering Corporation, Ltd.
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Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

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Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E. R. J.

POSITIONS VACANT

COMPETENT armature winder wanted to rewind and repair different types of armatures. P-589, Electric Railway Journal, 10th Ave. at 36th St., New York.

POSITIONS WANTED

A FORMER Eastern man, now connected with a Western road, with seventeen years' railroad experience, fourteen years with a large agency from operative to executive, now desires a connection either as special agent or assistant to special agent. Know the inspection game from end to end including labor, arbitration, employment; superintendent, etc. Some road somewhere needs a man of my type, one that went through the old days and has never learned the new days as far as hours are concerned, as my middle name is still work. PW-583, Electric Railway Journal, Rialto Bldg., San Francisco, Calif.

MANAGER, assistant manager or general superintendent, twenty years' experience in electrical railway work, principally interurban, available August first. Technical. Successful organizer. Tactful in public relations. Very resourceful in rehabilitating property. Energetic and capable executive. Successful record as an economical operator. Prefer connection with electrified steam road or interurban railway. State complete information first letter. PW-586, Electrical Railway Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of transportation, with a proven successful record of nineteen years on city, suburban and interurban properties, solicits correspondence with managers who are in need of a capable, efficient superintendent; successful in dealing with public and labor; recognized as an operating official who gets results; at present with large property; personal reasons for desiring a change. High grade references furnished as to ability to take over any property and get results. PW-568, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

ROADMASTER, twenty years on electric railways, references the best; have handled nearly all kinds of paving; also arc and acetylene welding; have a proven record as trackman. Available any time. PW-585, Electric Railway Journal, 10th Ave. at 36th St., New York.

WANTED

CRUSHED STONE CAR

Two or three compartments. Total capacity. 15 tons.

W-588, Electric Railway Journal
10th Ave. at 36th St., New York City.

WANTED

TRUCKS

25 Pair Brill No. 27-G, with 4-ft. or 4-ft. 2-in. wheel base. Give description, location and price.

W-584, Electric Railway Journal
1570 Old Colony Bldg., Chicago, Ill.

FOR SALE

50-Ton Electric LOCOMOTIVE

600 Volt—D. C.

Locomotives are complete in every respect and are in excellent condition.

Full Specifications Upon Request

Hydro Salvage Syndicate
Niagara Falls—Ontario

Good Relaying Rails

Are as Serviceable as New Rails, with a Big Saving on the Price

We have ready for prompt shipment First-Class Relaying Rails in various weights. Get in touch with us, stating what weight rail and tonnage desired, and we will submit quotations.

HYMAN-MICHAELS COMPANY
531 Peoples Gas Bldg., Chicago

OFFICES AND PLANTS AT
St. Louis, Mo. Detroit, Mich.
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FOR SALE

3—J. G. Brill One Man Safety Cars

Equipped with 2 G. E. No. 67 Motors, G. E. B23 Controls 35 ft. long, single truck, good condition.

Immediate shipment. Further information on request.

WEST VIRGINIA UTILITIES CO.
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New Motor Repair Parts

IMMEDIATE SHIPMENT

We have in stock virtually every part necessary to complete all of the types of non-interpole motors. They are new and were manufactured by either the Westinghouse Company or the General Electric Company. They may be purchased at 20 per cent less than the manufacturers' present prices.

Send your orders to us and deduct 20 per cent from the current quotations.

What have you for sale?

TRANSIT EQUIPMENT CO.
Cars—Motors
501 Fifth Avenue, New York

FOR SALE

20—Peter Witt Cars

Weight Complete, 33,000 lbs.

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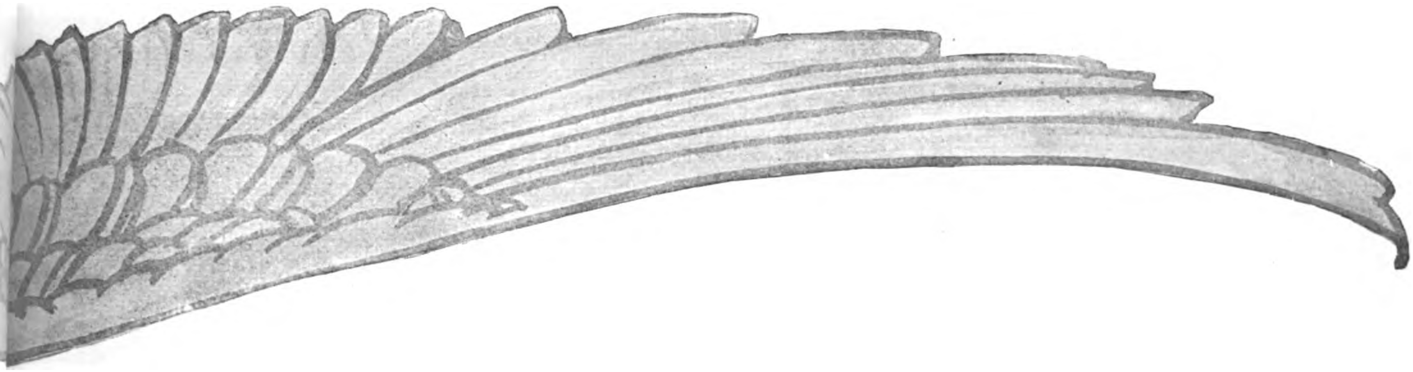

Buy war surplus as you buy automobiles
Investigate First

Why does an automobile dealer urge a demonstration—a ride in his car?

Merely so that the prospective purchaser may be thoroughly convinced as to its quality—its power—its ease of operation.

Investigation is the thing that *satisfies*—that shows exactly what is being bought—that prevents mistakes and disappointments.

The Government, through its liquidation of War Department surplus material has much the same selling problem. With tremendous stocks on hand to return to industry it plays no favorites. American business men, large and small, are welcomed as customers—

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First, because investigation will show exactly what these Sales offer in the way of merchandise. And inspection, plus weighing values, leads to buying.

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By looking into War Department Sales you, as a business man, will be doing yourself a service by grasping the chance to set your price on profitable material. In addition, you will be playing a part in the great plan of liquidating this surplus material over a widespread area, in such a manner as not to cause a ripple of disturbance on the surface of sound American business conditions.

Serve yourself.

Serve your Government.

Investigate.

The Way to Investigate

Watch your Commercial Business Publication and the Metropolitan Dailies for announcements of specific auction or sealed bid sales.

Send for the Catalog mentioned in the announcement.

Check off the items that interest you.

Send a representative to the sale to inspect the materials—in advance, *if possible.*

To ensure you more leeway, send your name and address at once to Major J. L. Frink, Chief, Sales Promotion Section, Room 2515, Munitions Building, Washington, D. C. Advise him the character of materials you are interested in, and catalogs containing such materials will be forwarded you as rapidly as sales are scheduled.

Final commodity sales will begin in September and continue until liquidation of stocks is completed at the Quartermaster Depots in Brooklyn, Chicago, San Antonio and San Francisco. Offerings include a wide range of Quartermaster Supplies, Ordnance Property and smaller quantities of Engineer Property, Chemical Warfare and Medical and Hospital Supplies.

Important sales of Real Estate, Buildings, Plants and Warehouses will be held at Camp Devens, Ayer, Mass.; Camp Dix, N. J.; Ordnance Reserve Depot, Amatol, N. J.; Camp Meade Md.; Ordnance Reserve Depot, Toledo O.; Camp Knox, Louisville, Ky., and Camp Lewis, American Lake, Wash Definite dates will be announced later

Look for the Eagle before you shop.

WAR DEPARTMENT

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

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Collier, Inc., Barron G.
Air Receivers, Aftercoolers
Ingersoll-Rand Co.
Anchors, Guy
Electric Service Sup. Co.
Ohio Brass Co.
Standard Steel Works Co.
Westinghouse E. & M. Co.
Armature Shop Tools
Electric Service Sup. Co.
Automatic Return Switch Stands
Ramapo Ajax Corp.
Automatic Safety Switch Stands
Ramapo Ajax Corp.
Axles
Bemis Car Truck Co.
Axles, Car Wheel
Bemis Car Truck Co.
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Carnegie Steel Co.
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Babbitting Devices
Columbia M. W. & M. I. Co.
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Barges, Steel
American Bridge Co.
Bearings an Bearing Metals
Bemis Car Truck Co.
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Westinghouse E. & M. Co.
Bearings Center and Roller Side
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Babcock & Wilcox Co.
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General Electric Co.
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Railway Track-Work Co.
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Le Carbone Co.
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Stackpole Carbon Co.
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Ingersoll-Rand Co.
Buildings, Steel
American Bridge Co.
Bus Bars
American Copper Products Corp.
Buses, Motor
Brill Co., The J. G.
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National Vulcanized Fibre Co.
Bushings, Case Hardened and Manganese
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Kuhlman Car Co., G. C.
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General Electric Co.
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General Electric Co.
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Cleveland Fare Box Co.
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Cleveland Fare Box Co.
Coin Wrapping Machines
Cleveland Fare Box Co
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Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.
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Ingersoll-Rand Co.
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Alphaduct Co., The
Connectors, Solderless
Westinghouse E. & M. Co.
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Consolidated Car-Heat'g Co.
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Crossing Foundations
International Steel Tie Co.
Crossing Frog and Switch
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Wharton, Jr., & Co., Wm.
Crossing, Manganese
Ramapo Ajax Corp.
Crossings Track (See Track, Special Work)
Crossings, Trolley
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Crushers, Rock
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Morton Mfg. Co.
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Electric Equipment Co.
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Wish Service, P. Edward
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Drills, Track
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Ingersoll-Rand Co.
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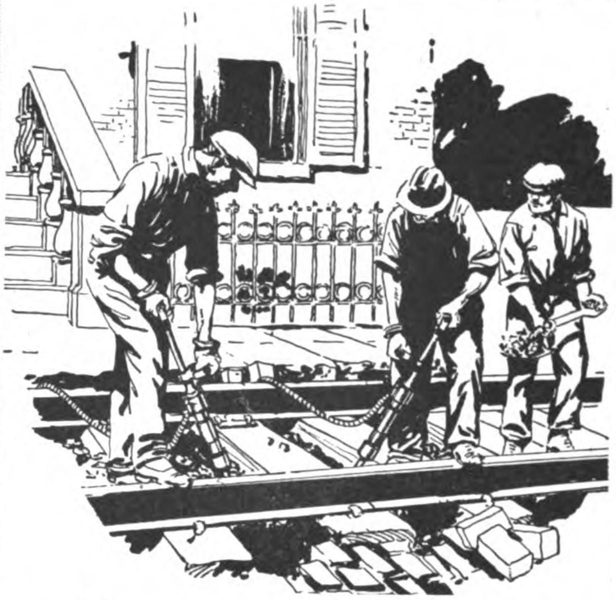

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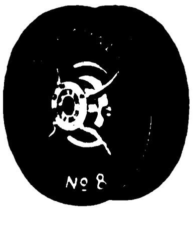

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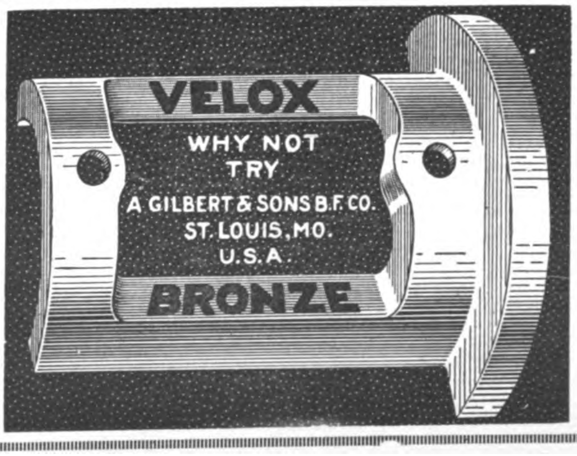

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Ramapo Ajax Corp.

Manganese Steel Special Track Work
Ramapo Ajax Corp.
Wharton, Jr., & Co., Wm.

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Motor Buses (See Buses, Motor)

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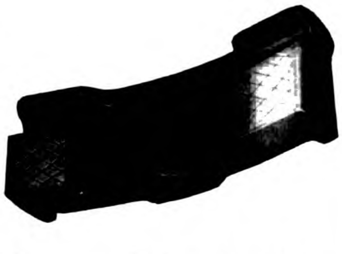

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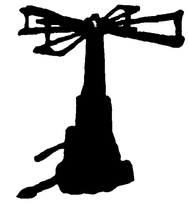

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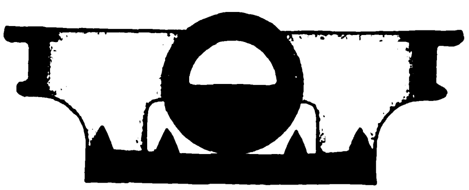

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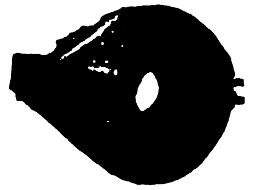

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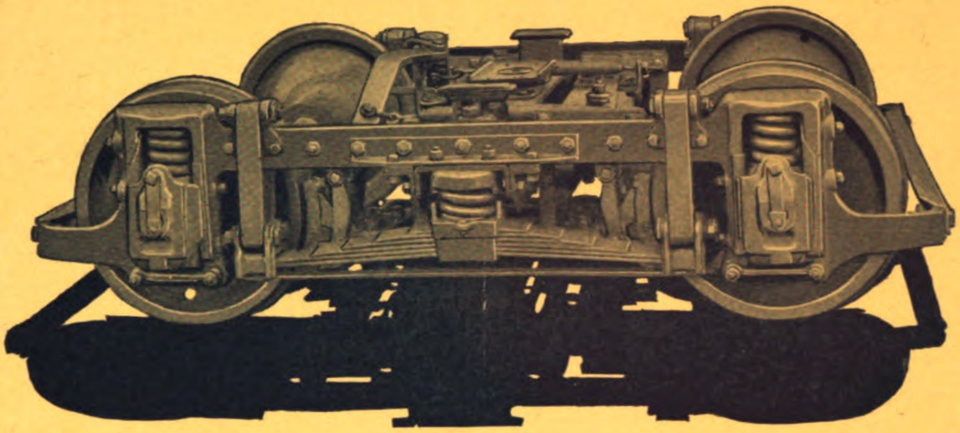

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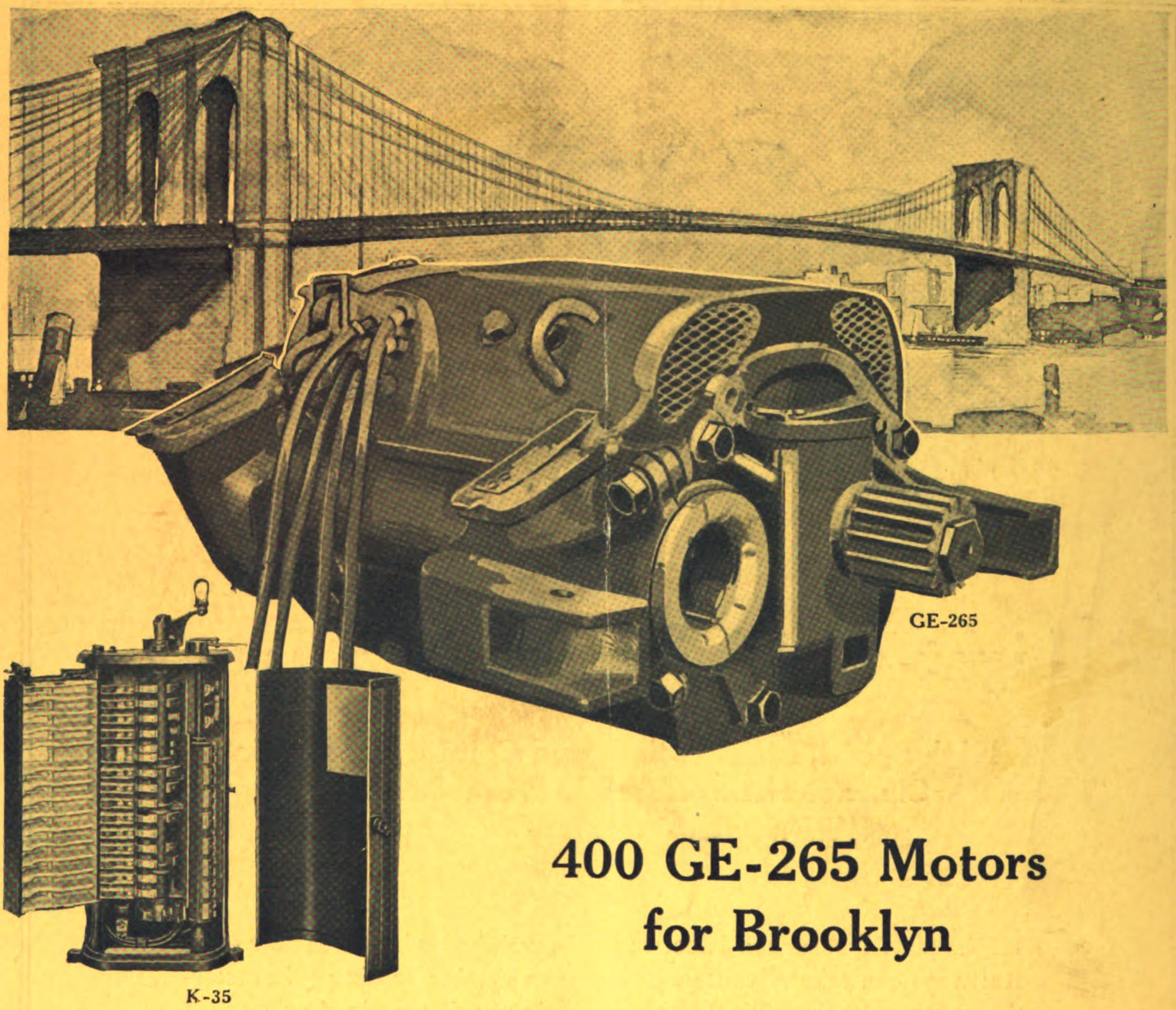

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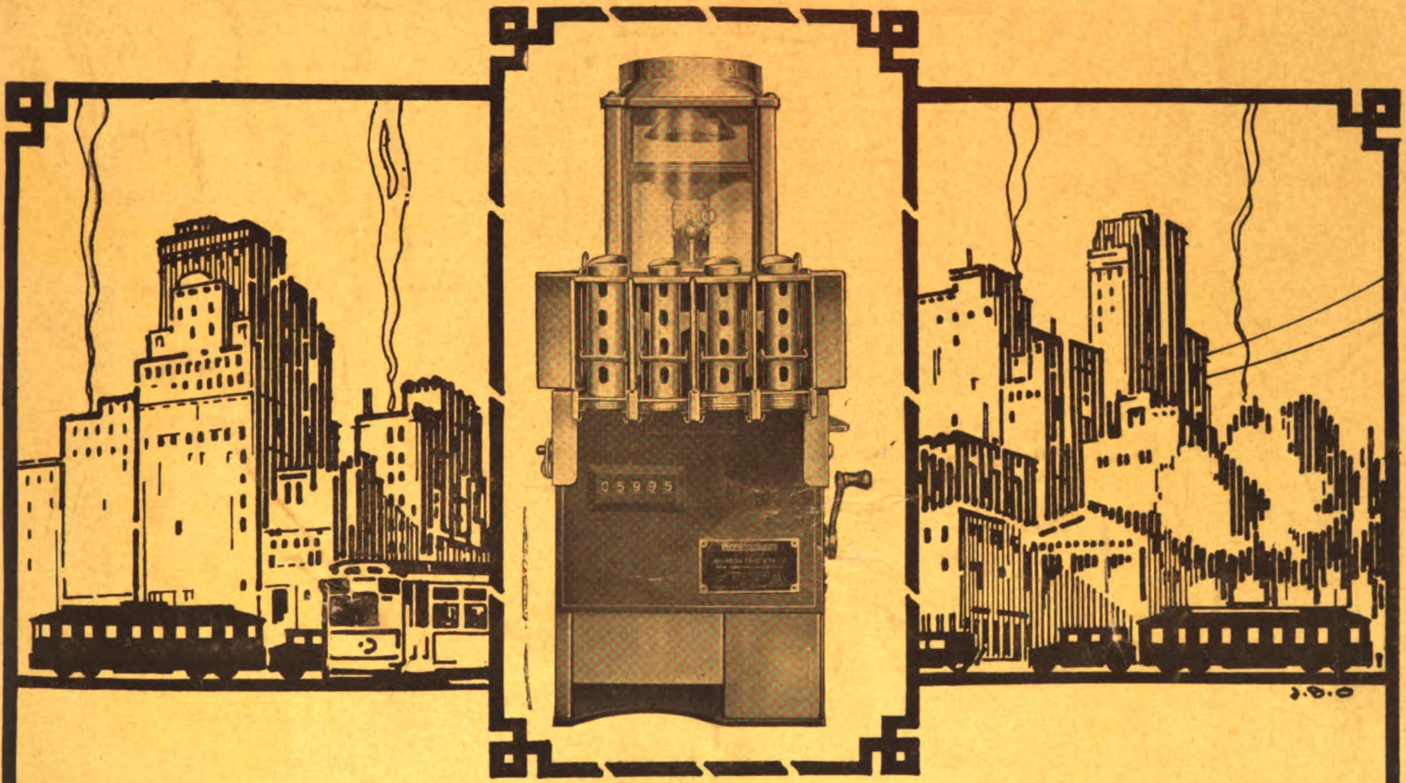

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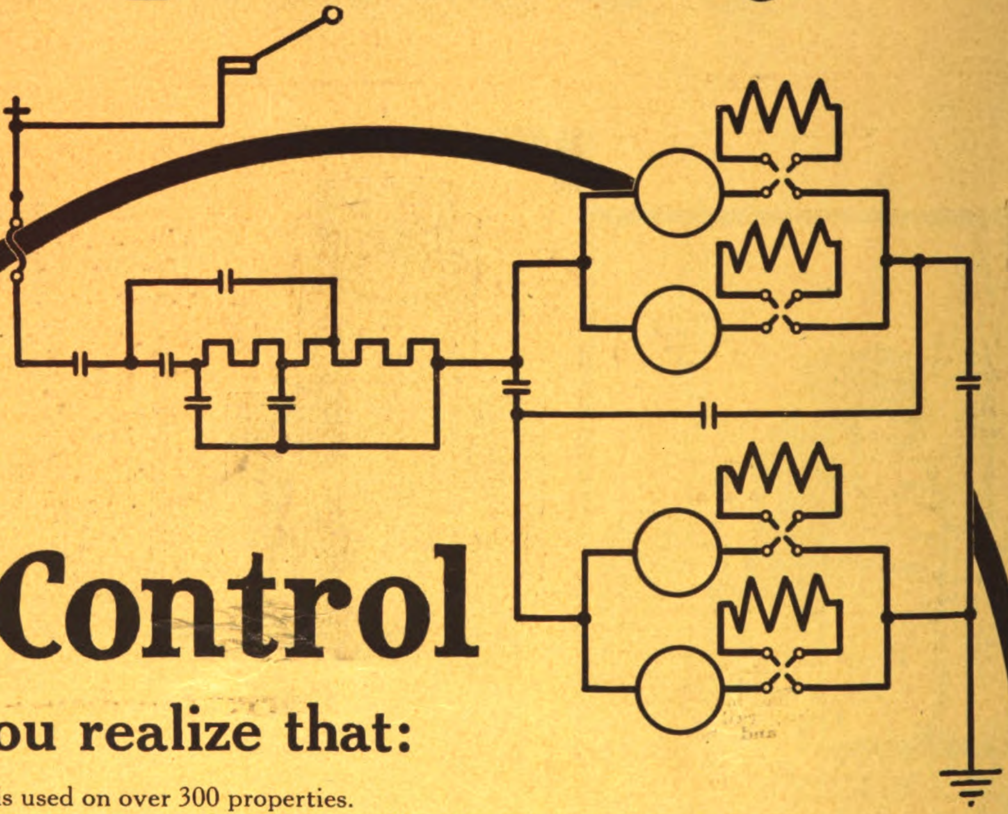

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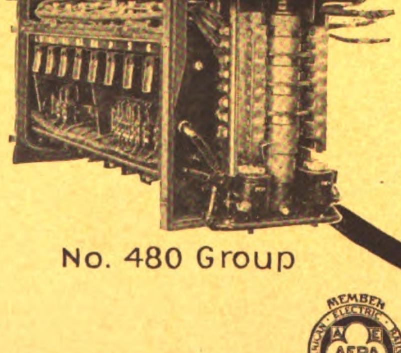

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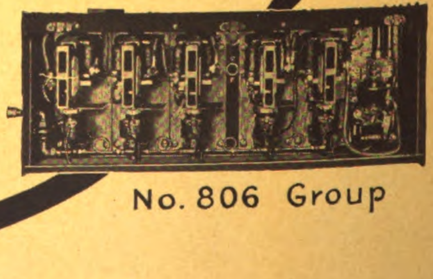

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Correspondence

ON this department all other departments lean heavily.

The girls you see industriously operating typewriting machines are transcribing dictaphone records, copying manuscripts and writing stencils. More than a hundred associate editors and heads of business departments use dictaphones exclusively. Under the direction of the experienced woman in charge, these girls turn out at least 16,000 letters, 3,000 manuscript pages and 3,500 form letters each month. Much of the work is difficult, filled as it is with technical terms. Three messengers are kept busy collecting and returning the work. When an editor writes "Wanted by 3 p.m. Thursday" on a manuscript, he means just that, not 9:30 a.m. Friday.

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The capable manager of this department who has been with the House of McGraw-Hill more than ten years, assists new operators by listening to records and explaining unaccustomed phraseology, makes clear to copyists the editorial markings on manuscripts and sees that all of this work is delivered at the time promised.

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W
WESTINGHOUSE ELECTRIC

For Dependable Crane Service

use Westinghouse motors.

Oftentimes a disabled crane will seriously hamper the repair of locomotives so that the production of the entire shop is retarded.

To prevent just such occurrences as this, an ever increasing number of railroads are using cranes equipped with Westinghouse motors. They find them a necessary adjunct in the maintenance of their shop schedules.

And the reasons for the value of Westinghouse crane motors are:

reliability
great mechanical strength
accessibility
high continuous rating
rugged construction.

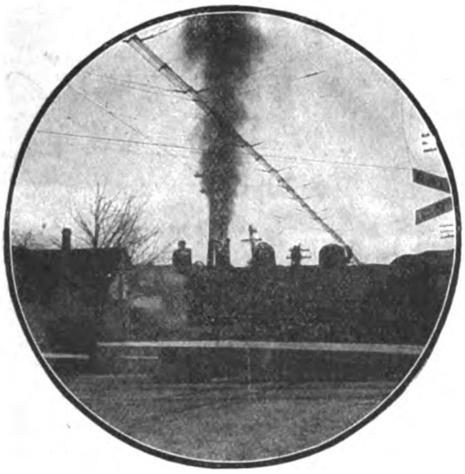
These five features form the foundation upon which the motor is built.

Is it any wonder that they are so widely used and so universally relied upon?

Specify Westinghouse motors and controllers.

Westinghouse Electric and Manufacturing Company
East Pittsburgh, Pa.

Westinghouse



If—

If you knew in advance that the trolley wheel of one of your cars would fly off on a steam-road crossing—

If you knew that this car would be loaded with your regular patrons, some of them even your personal friends—

If you knew that a fast train would arrive at this crossing at about the same moment—

If you knew that there would not be sufficient time to replace the trolley wheel before the locomotive reached the crossing—

If you knew that there would not be sufficient time or warning for the car passengers to unload—

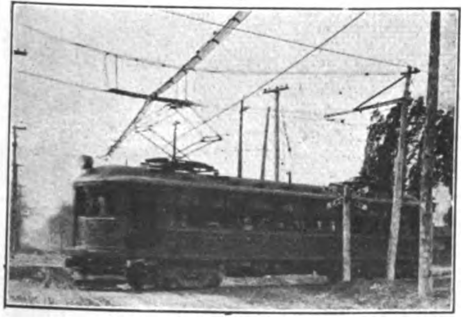
If you knew positively in advance of these circumstances and that the locomotive would strike the car with its consequent tragedy—

If you knew all these things—you would not hesitate one moment NOW to put protection on that crossing—to string a trolley guard that would forestall the first of these suppositions. A trolley guard, always energized, that would catch the trolley wheel and carry the car safely over the crossing!

These are not unlikely suppositions—these circumstances have come about in the past.

National

Trolley Guard



Take out your prevention insurance now. Let one of our Engineers show you how simply this protection can be put into your steam road crossings.

The Ohio B Brass Co.

Mansfield, Ohio, U.S.A.

New York Philadelphia Pittsburgh Charleston, W. Va. Chicago Los Angeles San Francisco Paris, France

Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulato

Insurance plus Marsh & McLennan Service

Have You Finished the Job Right?

Your personnel has been chosen wisely; your plant has been planned carefully; your methods are the last word in efficiency and your products find an insatiate market. Have you finished the job right?

If fire can damage your plant or accidents disorganize your personnel and drive your customers to waiting competitors, you cannot rest secure.

Insurance is the final and fitting step of the wise executive who finishes the job right. He takes care of today and has the vision to protect himself against the emergency that may come at any time. He is prepared against all contingencies by having adequate insurance for his business in all its branches.

As carefully as you choose your banker, just as carefully should you choose your insurance broker. The one assists, the other safeguards your business.

"He who serves best profits most."

MARSH & McLENNAN

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Minneapolis
New York
Detroit

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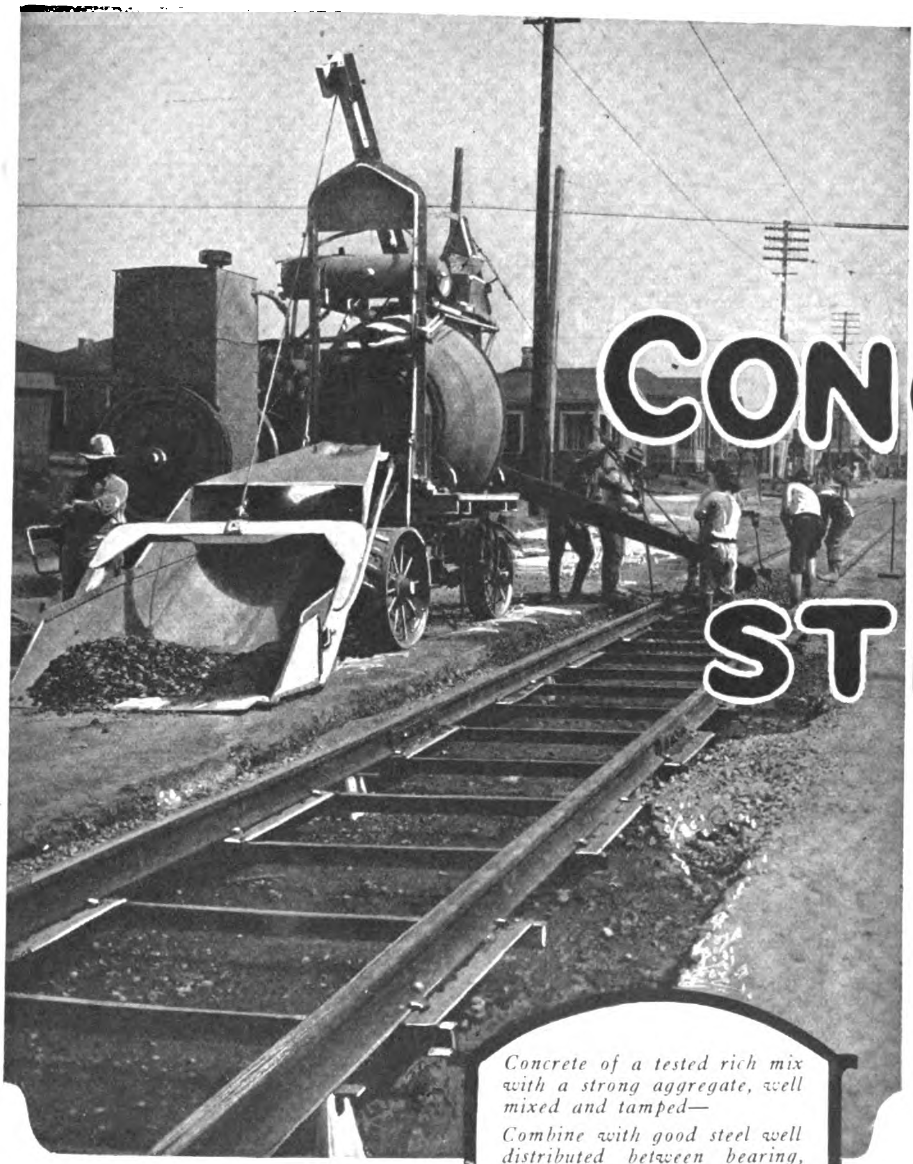
Duluth
Columbus

San Francisco
Seattle
Cleveland

Winnipeg
Montreal
London



CONCRETE STEEL

Concrete of a tested rich mix with a strong aggregate, well mixed and tamped—

Combine with good steel well distributed between bearing, reinforcement and tie members. These are the logical permanent materials for the foundation of the best paved track.

There is nothing in such construction to absorb water; to start cracks nor to rot and undermine the rail and joints.

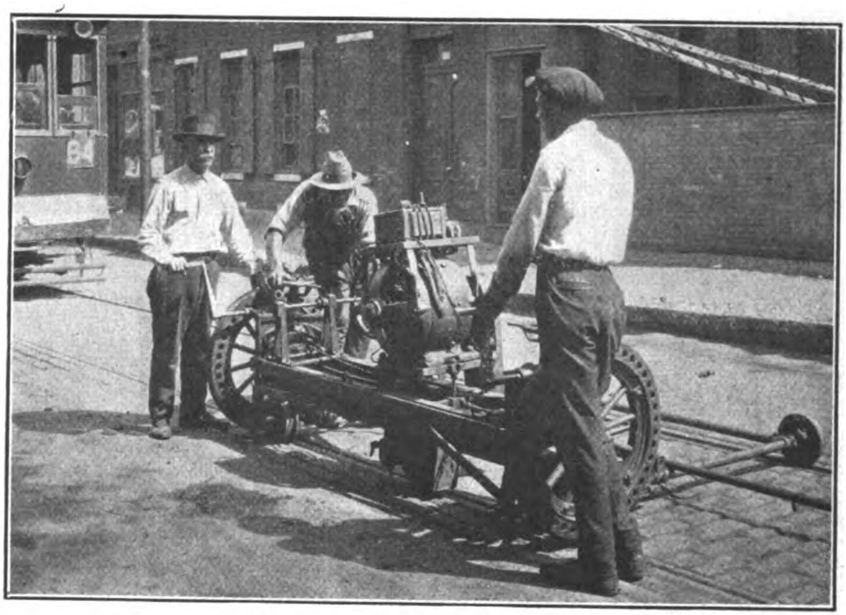
When you hear that such construction is lower in first cost than wood tie construction, the rumor deserves intensive investigation.

Write, or wire, for prices definite shipping date, guaranteed freight rate, and folder on "Costs, Methods and Best Practice in Steel Tie Track Construction."

All Permanent Materials Make Long Lived Track

The International Steel Tie Company
Cleveland, Ohio
Canadian Representatives
Sarnia Bridge Company, Limited
Sarnia, Ontario

Steel Twin Tie Track



For Economical Track Maintenance

UNIVERSAL
Rotary Track Grinder

This All-Around Grinder is fast!

Its tilting grinding wheel makes it invaluable for all kinds of track grinding work. Frogs, switches, mates, and crossings, are ground easily and quickly. Its strong motor makes it unusually fast.

It has the following features:

1. Tilting Grinding Wheel to grind on angle of rail head.
2. Large Rubber-Tired Derail Wheels.
3. Outboard Bearing on Grinding Wheel Arbor.
4. Adjusting Outrigger.
5. Easy adjustment and access to all parts.
6. Simplicity of operation.

RECIPROCATING Track Grinder

For removing all trace of corrugations. Restore original contour to rail head. Fast, efficient, and effectively operated by common labor.

AJAX Electric Arc Welder

Portable, compact, modern welder for building up defective rail. Weight 150 lbs. Operates effectively on low voltages.

ATLAS Rail Grinder

For grinding off excess metal after welding operations.

A light-weight Rotary grinder. Suitable for working under heavy traffic condition.

RAILWAY TRACK-WORK COMPANY

3132-48 E. Thompson St., Philadelphia, Pa.

AGENTS:

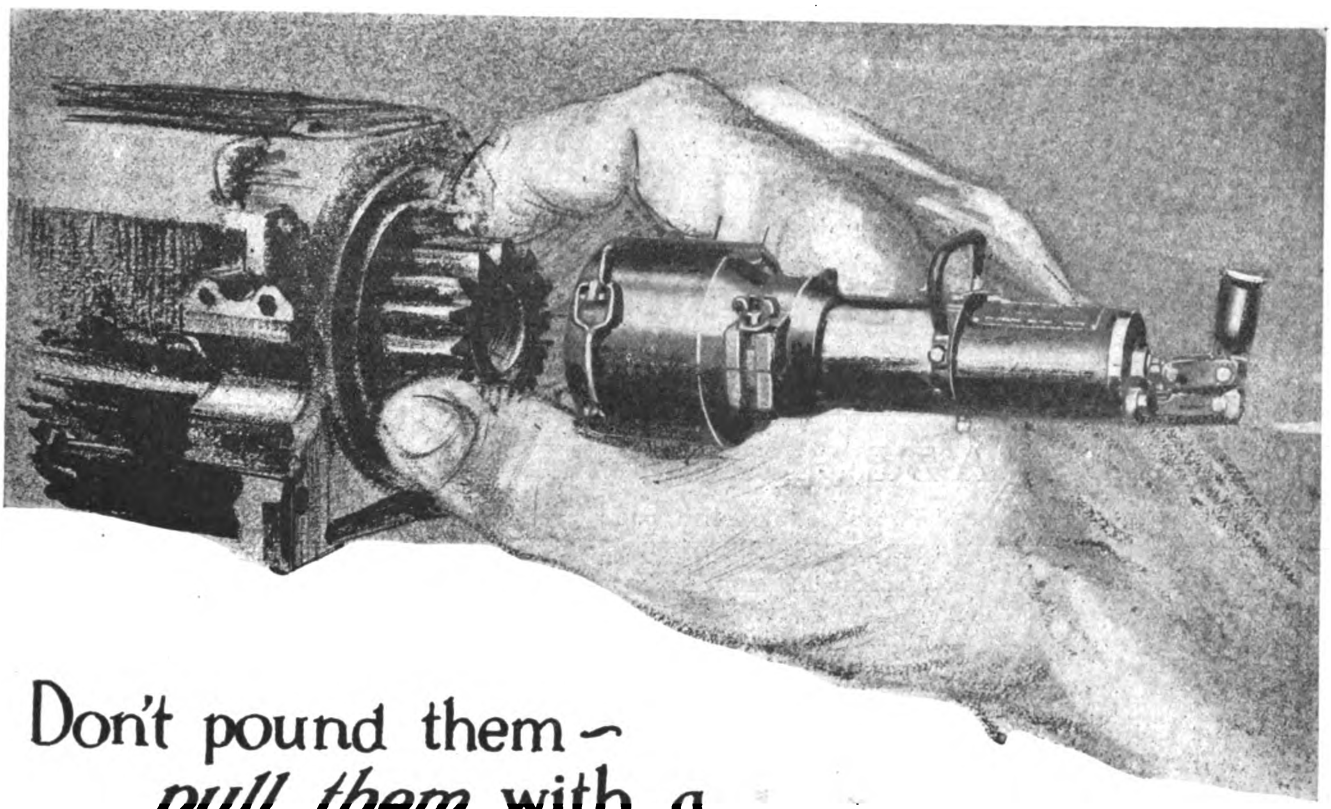
Chas. N. Wood Co.
Boston

Electrical Engineering & Mfg. Co.
Pittsburgh

Atlas Railway Supply Co.
Chicago

P. N. Wood
New Orleans

Equipment & Engineering Co., London, Walter M. Graham, Toronto



Don't pound them— *pull them* with a **Peerless Pinion Puller**

Resistless yet harmless

So powerful that even the slightest man can pull the toughest pinion with a few strokes of the lever. So nicely fitted and so smooth in action that it will not even scratch or mar the pinion and shaft. It fits over the pinion and pulls in a straight line.

A one-man apparatus, functioning on the hydraulic power principle and using oil as the medium so that there is no danger of freezing. Weighs only 50 lbs.

It's easier, safer, quicker and cheaper to use the Peerless Portable Pinion Puller.

The price will interest you—write us

ELECTRIC SERVICE SUPPLIES CO
MANUFACTURER OF RAILWAY MATERIAL AND ELECTRICAL SUPPLIES

ELECTRIC SERVICE SUPPLIES CO.

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The NEWS and NOTHING But the NEWS

A B P STANDARD No. 4

"To refuse to publish 'puffs', free reading notices or paid 'write-ups'; to keep his reading columns independent of advertising considerations, and to measure all news by this standard: 'Is it *Real News?*'"

RATHER sweeping in its provisions but necessary if our papers are to hew to the line marked out by Standard No. 1 of our decalogue, which provides that a member of the A B P must "Consider FIRST the interests of the subscriber."

This does not mean that a publisher may not print news about manufacturers and their products, and mention both by name. The makers and vendors of raw and finished products in this field are a part of the industry, a vital part; you are entitled to all the information about them and their goods which will aid you forming intelligent decisions.

It is the business of your business paper to bring you this news, but to present it *wholly* from the standpoint of its NEWS value to you. It is the avowed purpose of every A B P paper to keep its news columns free and clear of the least taint of advertising considerations.

The interests of the subscribers must be paramount.

WHAT IS THE A B P, ANYWAY?

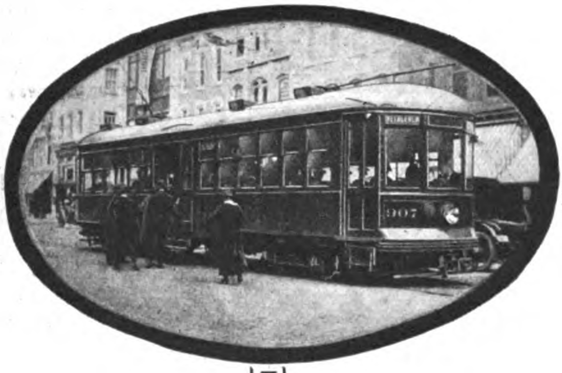
It is a voluntary organization of independent trade, technical and class publications, in this country and Canada, banded together to promote the highest possible publishing standards. Membership is contingent upon the acceptance and maintenance of its standards.

THE ASSOCIATED BUSINESS PAPERS, INC.

JESSE H. NEAL, *Executive Secretary*

HEADQUARTERS: 220 West 42nd STREET NEW YORK CITY

The Electric Railway Journal is a member of the A.B.P., Inc.



For Electric Railway Cars—

and for Motor Buses—

NATIONAL PNEUMATIC EQUIPMENT

affords faster and safer transportation

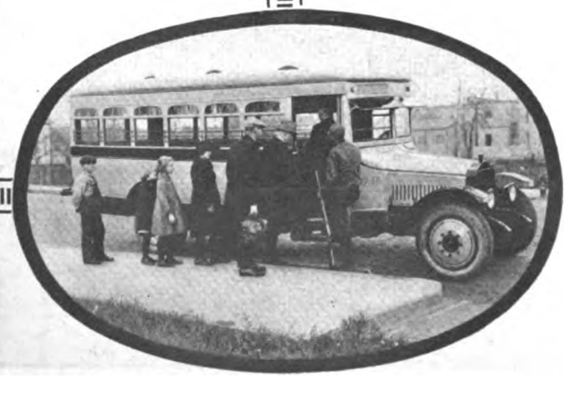
Equally applicable to automotive transportation units as well as railway cars. Pneumatic operation of doors and steps saves seconds at every stop, relieves the operator of the extreme muscular fatigue, resulting from hand-operated doors, and practically eliminates the risk of boarding and lighting accidents.

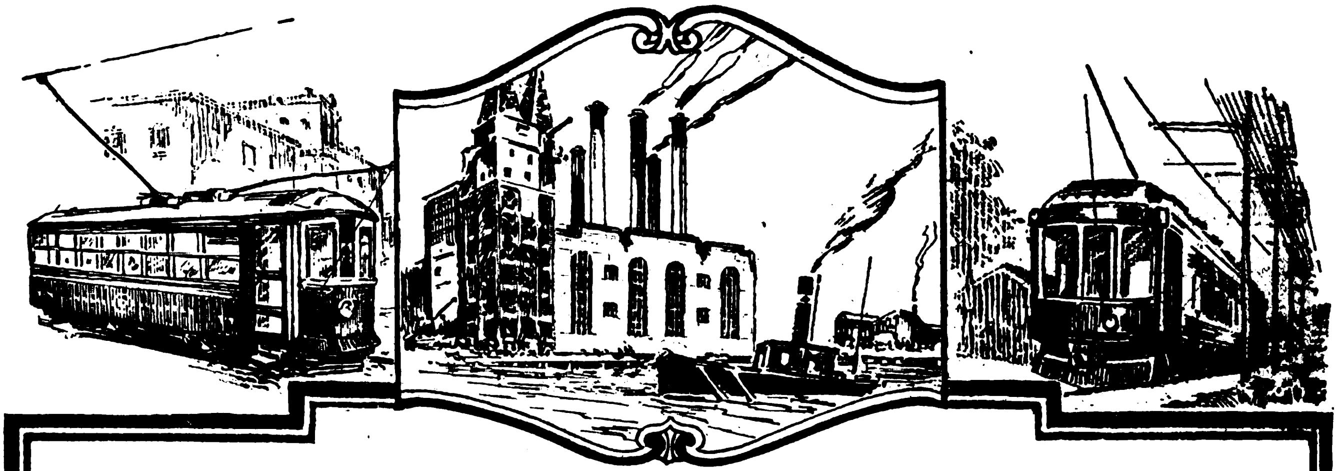
National Pneumatic Door Engines are simple, rugged and easy to install. They are actually in service on over 65,000 electric railway cars today.

Our Service Department will co-operate on installation plans without charge.

Write for details.

NATIONAL PNEUMATIC CO.
Incorporated
Originators and Manufacturers
***Principal Office:* 50 Church St., New York**
Philadelphia—Colonial Trust Bldg.
Chicago—McCormick Building
Works—Rahway, New Jersey
Manufactured in Canada by
Dominion Wheel & Foundry Co., Ltd., Toronto, Ont.





As many Street Railways are using Buses a discussion of their operation is pertinent—and we offer the following:

MAKE EVERY BUS A BETTER BUS

A bus is a "power plant on the road," and to be kept continually running certain precautions should be taken:

1—Rigid Inspection

It is true that all automotive engines are very nearly fool-proof, and yet for that very reason nothing should be taken for granted. Small troubles grow into larger ones if neglected. Have the data about each unit. Forewarned is forearmed.

2—Drain Crank Cases Frequently

This one thing will do more than any other to prolong the life and efficiency of an automotive engine.

3—Wash Crank Case with Texaco Corvus Oil

This is a light oil especially suited for the purpose. Unlike kerosene, which is so often used, Texaco Corvus Oil will not cut or dilute the lubricating film on cylinder walls and bearings.

4—Use Texaco Motor Oil

The best is none too good for the heavy duty to which most busses are subjected. Texaco Motor Oils—clean, clear, golden colored, full bodied, are being used by large fleet owners after tests. The user of Texaco Motor Oils is never troubled with hard carbon.

5—Use Texaco Gasoline

Texaco Gasoline is volatile, uniform, high powered. Insures instant starting, quick pick-up, flexibility of acceleration and economy in operation.

6—Texaco Thuban Compound for Transmissions and Differentials.

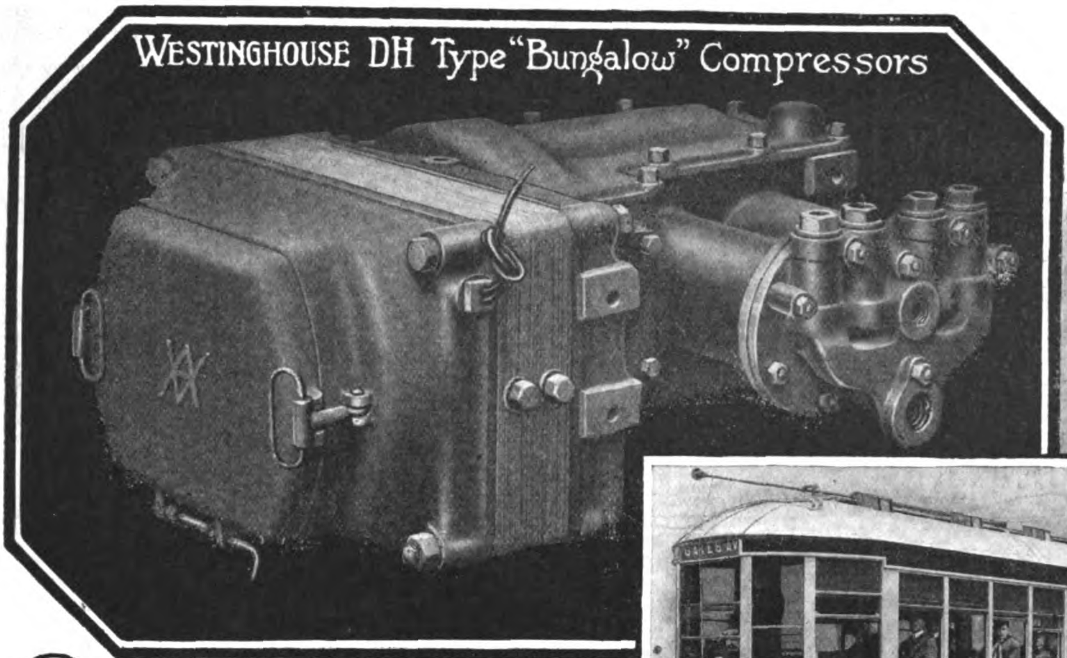
This lubricant is unique in that so very little is required. The small amount used is sufficient to keep all of the gears coated with a wear-resisting film of lubricant.

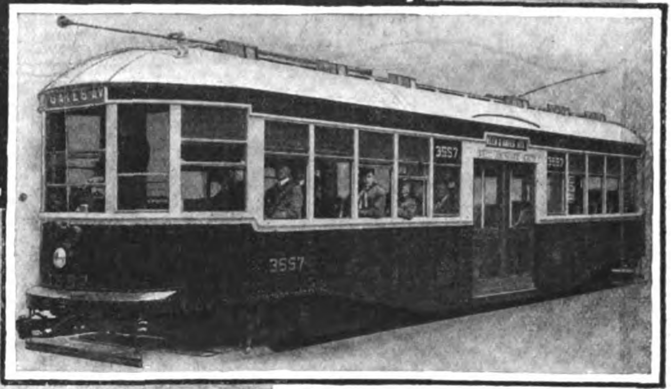
What Texaco has done in the way of cutting costs of operation on thousands of street cars is being duplicated on the buses of this country.

There is a Texaco Lubricant for every purpose. Also Texaco Kerosene, Texaco Gasoline, Texaco Burning Oils.

THE TEXAS [illegible]
DEPT [illegible]

WESTINGHOUSE DH Type "Bungalow" Compressors





3 Sizes— Properly Constructed for Low-Built Cars

EASY TO GET AT

DH Compressors are highly popular with maintenance men owing to the quick and easy manner in which access may be gained to all parts. This feature encourages regular and careful inspection.

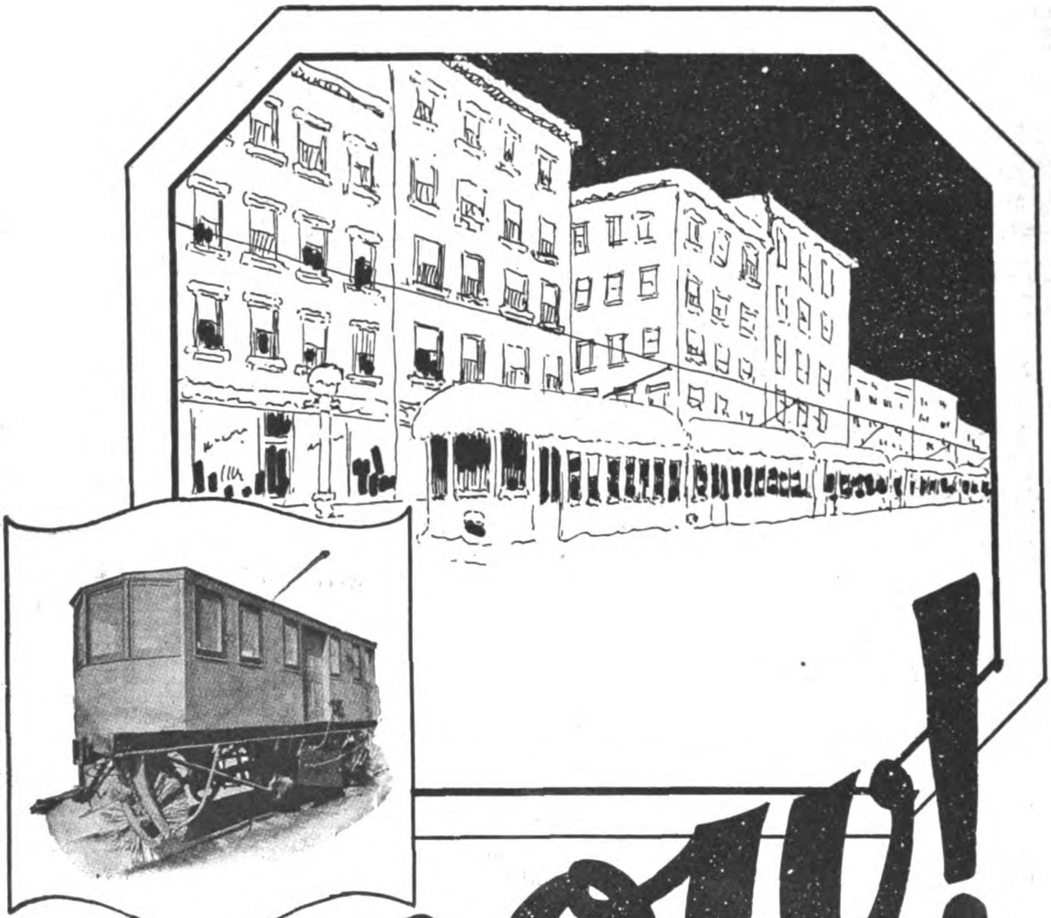
Most cars constructed at present are of the low-floor type, and for such cars the DH Compressor was "made-to-order."

In addition to fitting snugly in small spaces and providing ample track clearance for the lowest cars, DH Compressors offer a degree of mechanical perfection which appeals to the cautious buyer with an eye to steady, dependable service, long life and low maintenance cost.

Three sizes—10, 16 and 25 cu. ft. displacement—all of the same general design, therefore all properly constructed for low-built cars.

Westinghouse Traction Brake Company
General Office and Works: Wilmerding, Pa.

WESTINGHOUSE TRACTION BRAKES



Snow! — its Removal

As you read this your immediate problems may not, probably don't in fact, include snow. Yet in the back of your head you undoubtedly are lining up a plan for your next Winter's campaign for keeping tracks open and headways unimpaired. You're not going to wait for snow before you get ready to fight it.

Let us, therefore, remind you that approximately ninety-five per cent of all the electric snow sweeping equipment used in the United States and Canada is of McGuire-Cummings make. McGuire-Cummings sweepers *keep* tracks clear. When it starts to snow they start to sweep—that's all there is to it. Depend upon McGuire-Cummings sweepers for the solution of your snow problem next Winter.

McGUIRE-CUMMINGS MFG. CO.
General Offices
111 West Monroe St., Chicago, Ill.

City and Interurban Cars and Trucks, Safety Cars, Combination and Work Cars.
Snow Sweepers, Electric Locomotives

With Galena Oils and Service in the Field

Galena Power House lubricants are consistent in performance. Their unvarying uniformity makes them always dependable and unfailing in the delivery of satisfactory service.

They are in thorough keeping with the high grade machinery upon which they are used—the best quality of material, made specially for the particular service required. They protect and preserve the motion and bearing parts of equipment and maintain an unbroken oil film under all temperatures.

The installation of Galena Oils marks an immediate improvement in your lubrication. Our Service Engineer's recommendations will provide not only the proper oil but the correct method of use to give highly efficient and economical results.

From our Service Engineer's Reports*

"Since placed in service the 30,000 KW. water turbine has carried a continuous twenty-four load of 15,000 KW. The step bearing carrying this enormous weight, has been lubricated perfectly with our Power House Engine Oil."

——— o ———

"The reason that the change was made to Galena Oil was that engine cylinders were found to be so badly scored, and the lubrication costs at this plant had been much higher than at the others where Galena material is used."

——— o ———

"In this power house there is a 500 KW. Turbine which has been running almost continuously for over four years with Galena Oils, without a particle of trouble with lubrication."

——— o ———

"A 2000 KW. Turbine, making 3500 R.P.M. running continuously, with occasional stop on Sunday, was recently cleaned after a years service. The Galena Oil removed from the machine looked good as new."

——— o ———

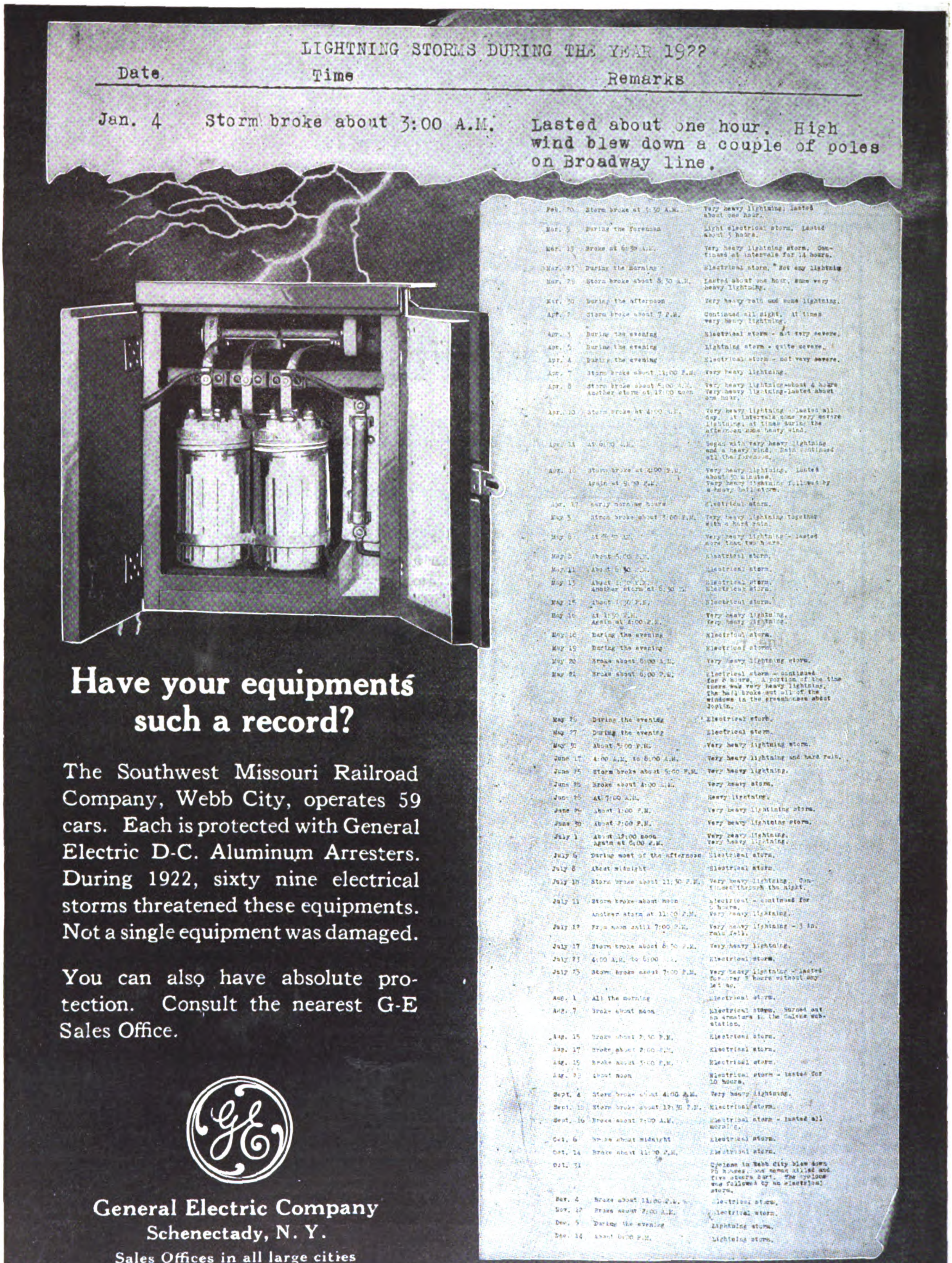
"Our extra good showing justified this gentleman's recommendation to his board for a Galena contract. It convinced them that Galena Oils were really more economical than the lower priced materials of our competitor."

**These excerpts are taken from the weekly reports of our Service Engineers. We vouch for their reliability and accuracy in every detail."*

Galena-Signal Oil Company

New York Franklin, Pa. Chicago

and offices in principal cities



LIGHTNING STORMS DURING THE YEAR 1922

Date	Time	Remarks
Jan. 4	Storm broke about 3:00 A.M.	Lasted about one hour. High wind blew down a couple of poles on Broadway line.
Feb. 20	Storm broke at 5:30 A.M.	Very heavy lightning; lasted about one hour.
Mar. 9	During the forenoon	Light electrical storm. Lasted about 3 hours.
Mar. 13	Broke at 6:30 A.M.	Very heavy lightning storm. Continued at intervals for 14 hours.
Mar. 23	During the morning	Electrical storm. Not any lightning
Mar. 29	Storm broke about 8:30 A.M.	Lasted about one hour. Some very heavy lightning.
Mar. 30	During the afternoon	Very heavy rain and some lightning.
Apr. 1	Storm broke about 7 P.M.	Continued all night. At times very heavy lightning.
Apr. 3	During the evening	Electrical storm - not very severe.
Apr. 3	During the evening	Lightning storm - quite severe.
Apr. 4	During the evening	Electrical storm - not very severe.
Apr. 7	Storm broke about 11:00 P.M.	Very heavy lightning.
Apr. 8	Storm broke about 5:00 A.M. Another storm at 12:00 noon	Very heavy lightning-about 4 hours Very heavy lightning-lasted about one hour.
Apr. 10	Storm broke at 4:00 A.M.	Very heavy lightning - lasted all day. At intervals some very severe lightning; at times during the afternoon some heavy wind.
Apr. 11	At 6:30 A.M.	Began with very heavy lightning and a heavy wind. Rain continued all the forenoon.
Apr. 16	Storm broke at 4:00 P.M. Again at 9:30 P.M.	Very heavy lightning. Lasted about 30 minutes. Very heavy lightning followed by a heavy hail storm.
Apr. 17	Early morning hours	Electrical storm.
May 3	Storm broke about 7:00 P.M.	Very heavy lightning together with a hard rain.
May 6	[illegible]	Very heavy lightning - lasted more than two hours.
May 8	About 5:00 A.M.	Electrical storm.
May 11	About 6:30 [illegible]	Electrical storm.
May 13	About 1:00 P.M. Another storm at 6:30 [illegible]	Electrical storm. Electrical storm.
May 15	About 1:30 P.M.	Electrical storm.
May 16	At 1:30 P.M. Again at 4:00 P.M.	Very heavy lightning. Very heavy lightning.
May 18	During the evening	Electrical storm.
May 19	During the evening	Electrical storm.
May 20	Broke about 5:00 A.M.	Very heavy lightning storm.
May 21	Broke about 6:00 P.M.	Electrical storm - continued for 8 hours. A portion of the time there was very heavy lightning. The hail broke out all of the windows in the greenhouse about Joplin.
May 26	During the evening	Electrical storm.
May 27	During the evening	Electrical storm.
May 30	About 5:00 P.M.	Very heavy lightning storm.
June 17	4:00 A.M. to 6:00 A.M.	Very heavy lightning and hard rain.
June 25	Storm broke about 5:00 P.M.	Very heavy lightning.
June 25	Broke about 4:30 A.M.	Very heavy storm.
June 26	At 7:00 A.M.	Heavy lightning.
June 28	About 1:00 P.M.	Very heavy lightning storm.
June 30	About 2:00 P.M.	Very heavy lightning storm.
July 1	About 12:00 noon Again at 6:00 P.M.	Very heavy lightning. Very heavy lightning.
July 6	During most of the afternoon	Electrical storm.
July 8	About midnight	Electrical storm.
July 10	Storm broke about 11:30 P.M.	Very heavy lightning. Continued through the night.
July 11	Storm broke about noon Another storm at 11:00 P.M.	Electrical - continued for 6 hours. Very heavy lightning.
July 12	From noon until 7:00 P.M.	Very heavy lightning - 3 in. rain fell.
July 17	Storm broke about 6:30 P.M.	Very heavy lightning.
July 23	4:00 A.M. to 6:00 [illegible]	Electrical storm.
July 25	Storm broke about 7:00 P.M.	Very heavy lightning - lasted for over 2 hours without any let up.
Aug. 1	All the morning	Electrical storm.
Aug. 7	Broke about noon	Electrical storm. Burned out an armature in the Galena substation.
Aug. 15	Broke about 2:30 P.M.	Electrical storm.
Aug. 17	Broke about 2:00 P.M.	Electrical storm.
Aug. 19	Broke about 3:00 P.M.	Electrical storm.
Aug. 23	About noon	Electrical storm - lasted for 10 hours.
Sept. 4	Storm broke about 4:00 A.M.	Very heavy lightning.
Sept. 10	Storm broke about 12:30 P.M.	Electrical storm.
Sept. 16	Broke about 7:00 A.M.	Electrical storm - lasted all morning.
Oct. 6	Broke about midnight	Electrical storm.
Oct. 14	Broke about 11:30 P.M.	Electrical storm.
Oct. 31		Cyclone in Webb City blew down 25 houses, one woman killed and five others hurt. The cyclone was followed by an electrical storm.
Nov. 4	Broke about 11:00 P.M.	Electrical storm.
Nov. 12	Broke about 7:00 A.M.	Electrical storm.
Dec. 5	During the evening	Lightning storm.
Dec. 14	About 6:00 P.M.	Lightning storm.

Have your equipments such a record?

The Southwest Missouri Railroad Company, Webb City, operates 59 cars. Each is protected with General Electric D-C. Aluminum Arresters. During 1922, sixty nine electrical storms threatened these equipments. Not a single equipment was damaged.

You can also have absolute protection. Consult the nearest G-E Sales Office.

General Electric Company
Schenectady, N. Y.
Sales Offices in all large cities

GENERAL ELECTRIC

33E 40

New York, Saturday, August 25, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Company, Inc.
HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 62
Number 8

Public Service Railway Would Go Into the Bus Business

THE people of New Jersey have much to gain by accepting forthwith the plan of settlement proposed by the Public Service Railway. Not only that; the railway would be greatly strengthened in its financial position and, therefore, in its ability to give the territory good transportation by such acceptance. The concessions which the company finds it possible to make, conditional on acceptance of the plan, such as better wages to men, lower fares and improved service, show the people some of the many advantages which should accrue to them through a unification of all transportation.

The plan offered would put the company in the position it logically should hold with respect to transportation in the territory served, namely, a true monopoly, with bus and railway in a co-ordinated service. Heretofore, the railway has had to submit to all the obligations and regulations of a monopoly, but has been deprived of the reciprocal obligation on the part of the public to protect it against competition that obviously has been unfair. The monopoly now proposed would retain for the public whatever benefit the coming of the bus has meant and yet enable the company to place itself in a position where it might hope to earn the fair return to which it is entitled.

Furthermore, the proposed plan is fair and is appealing. The company has about gone the limit in its endeavor to reach a basis of settlement that would win general approval. It has conceded the employees the 20 per cent wage increase which was the men's final demand before the strike, and they have promptly accepted. It has consented to reduce the cash fare 1 cent, making the fare on bus or railway, with interchangeable transfer privileges, 7 cents and 1 cent for transfer. It has agreed to accept a valuation of $110,000,000, which is the amount found by the special master appointed by the Federal court, and which is $15,000,000 less than the amount found by Ford, Bacon & Davis after a study of nearly a year while retained by the state. It has agreed to purchase all competitive buses in service on July 31 and give employment either on buses or cars to all bus drivers who can qualify under the railway's regular standards. It has agreed to operate buses, co-ordinated with the cars, to the extent necessary to accommodate traffic, and to modernize and standardize the buses. It has agreed to resume service promptly upon assurance of acceptance of the plan, with the new rate of wage and, temporarily, the old rate of fare. All this is conceded provided that the plan is accepted as an entirety, that the licenses of all competitive bus owners shall be rescinded and no further competitive bus licenses granted, and that the commission agrees to the $110,000,000 valuation.

Whether the twenty-one-day shutdown of service was a necessary prelude to this proposal of the company and whether it has served a useful purpose are debatable questions. Meantime the commission has given consideration to the company plan, and while it has indicated that there are some difficulties in the way of acceptance in full, it has said that it would accept the plan as a "basis for discussion and conference." Hence its position does not seem so far apart from the company's that general agreement cannot be hoped for. The commission, however, emphasizes that the company should resume service as the first step, rather than hold off until the full acceptance has been assured.

Should the final result be the acceptance of the company's proposal, in substance, there is reason to look for an altogether new era of transportation service in New Jersey with a good prospect of financial success for the enterprise.

Accounting Changes Suggested by the Supreme Court Valuation Decision

A NUMBER of valuation engineers believe that some new measures in accounting methods are desirable, in view of the decision of the Supreme Court in the valuation case of the Southwestern Bell Telephone Company (State of Missouri vs. Public Service Commission of Missouri), decided May 21, 1923. While the court discussed the question of reasonable rates and the validity of certain operating expenses, the most important part of its decision was where it declared definitely, following the Minnesota rate case, that it is the property, and not its original cost, of which the owner may not be deprived without due process of law. Strictly speaking, this means that the utility rates for any definite period must be based on the value of the property in that period. In fact, the court says, "Estimates [of value] for tomorrow cannot ignore prices [of construction] of today." Thus the court went definitely on record in favor of the inclusion of current values in fixing a basis for rates, in spite of the very able argument for the investment method of valuation for rate purposes, presented by Justice Brandeis, with whom Justice Holmes concurred.

The decision in the Southwestern Bell Telephone case is the latest of a series rendered in federal and state courts, all following the same general trend, by which the value of utility property for rate-making purposes is being defined. To mention a few only, the historic case of Smyth vs. Ames, decided in 1898, listed the general elements to be taken into account in a valuation of this kind but did not give the relative weights to be attached to each. The Kansas City Southern case of the Supreme Court, decided about three years ago, was perhaps the first to emphasize the great importance of current values. The Minnesota rate cases are mentioned above. In the Elizabethtown Gas case, the New Jersey Supreme Court declared essentially that the dollar of the present day has an entirely different purchasing power than formerly and this fact must be taken into account. Other important cases bearing on this point were that of the St. Joseph Railway, Light & Power Company, a U. S. District Court decision, and the case of the Potomac Electric Power Company, decided by the U. S. Court of Appeals for the District of Columbia.

A strict interpretation of this ruling means that, other things being equal, the value of a property, with no changes in its capital account, will vary to some extent at least from year to year if there is a yearly variation in the cost of the materials and labor and other things that go to make up the valuation, though where a value for rate-making purposes is established for a property, this rate base will not change until further action is taken by the commission. Obviously, with this method of determining value, the utility should take great care to maintain an accurate inventory of the plant and all additions to it. This is more important than a record of the additional capital charges. In other words, it is more necessary to keep careful records of materials and labor used in construction than to tabulate merely the cost.

While the majority decision of the Supreme Court did not, like the minority opinion, discuss the effect of its conclusion from the standpoint of public relations, it is obvious that much can be said from that point of view in favor of the majority decision. In the first place it places utility valuation more closely in the same class with valuation of other properties for other purposes than does the investment theory. Another great advantage is that it will encourage and reward good judgment in selecting the best time for the construction of extensions and additions to the plant. With the investment principle, a management has no definite incentive, so far as increased return is concerned, toward economy when expanding its capital account. With the valuation of the property constantly changing, however, according to the current prices of material and labor, there is every incentive to make necessary additions to the plant at times when construction costs are low. Here also the Supreme Court decision puts the utility more in the class of other lines of business.

It is interesting to note that this decision has already been applied by the Pennsylvania Public Service Commission in the hearing to determine whether there should be any reduction in the fares of the Philadelphia Rapid Transit Company.

When a Car Is Not a Car

COMMENT was made on this page several weeks ago concerning the injurious effect upon electric railways of inaccurate newspaper stories. Another harmful practice of the daily press is the indiscriminate use of the word "car." Take, for example, the headline "Boy at play killed by car." The impression often is created that this fatality was the result of a street car accident. Only those who read further find that it was an automobile accident. Similar headlines appear frequently. In justice to the electric railways the use of such misleading headings should be avoided.

We must realize that this is a very natural error. Nearly every automobile owner refers to the vehicle as his "car." So general a usage will not be changed simply because railway men desire it. But newspaper editors are pretty fairminded, on the whole, and a diplomatic appeal might bring to an end this unfortunate use of the word.

Bus vs. Trolley Looks Different When All Factors Are Considered

WHILE few of the writers who have discussed the relative merits of trolley cars and buses have given serious consideration to the public's side of the question, it is a matter of such great importance that it should not be passed over, as it so frequently is in these discussions. At a recent hearing on the subject, it was brought out that a township having some three miles of double-track trolley line was facing an expenditure of $25,000 for paving if the trolley went out of business. The same township is receiving $30,000 a year from the company in taxes and licenses, while at most, under present conditions, the buses that might replace the trolley could not be forced to pay more than $1,800, according to the Mayor of the township.

The question of paving is well covered in the article by Victor Topping in this week's issue. The figures he presents are based on studies made for the Toronto Transportation Commission in order to determine the most economical type of service to be provided on certain extensions to its system. While the first costs given by him are somewhat high for conditions in the United States, as he notes, this fact favors the buses in his results on account of the lower permanent investment required as compared to the railway.

Those who are familiar with the maintenance of modern pavements know only too well the difficulties of keeping up a good surface with heavy motor traffic. Even the best types of construction known are none too permanent. The figures used in Mr. Topping's article of 1 cent per ton-mile for pneumatic tires and 1½ cents per ton-mile for solid tires, which were presented at the 1922 convention of the American Electric Railway Association as the cost of deterioration of highways due to operation of motor buses over them appear to be low, rather than the reverse.

The conclusion of the article based solely on the question of cost, that there is no field for the gasoline bus in mass transportation, would appear to be sound in the light of actual results obtained by various bus operators. Where service is infrequent, as in the suburbs, or for certain light interurban service, the trolley bus and the gasoline bus have their field. Special service where tracks or wires would not be tolerated, or where de luxe transportation is desired, furnish additional uses for the gasoline bus. But on the basis of cost of service for carrying the bulk of the population, the trolley car undoubtedly is the best.

Some individual bus owners may dispute figures on cost of service. However, these men do not make proper allowance for the labor they supply free of charge for inspection, making minor repairs and cleaning of their own buses. Nor do they figure their pay on the basis demanded by employees of a corporation. And of course a corporation would be necessary in any sizable bus undertaking. Many bus owners are their own chauffeurs and stay on the job eleven to twelve hours each day, after which they inspect their machines. They forget that at present they are furnishing base transportation only, and leaving the peak demands largely to the trolleys.

Operating Results of Automatic Door Safety Cars

By Charles Gordon

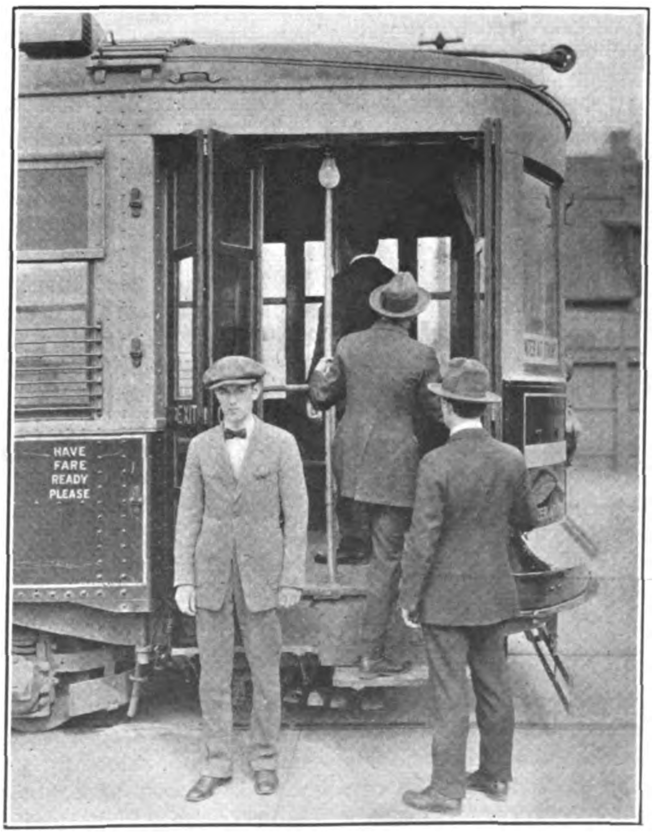
Western Editor ELECTRIC RAILWAY JOURNAL*

Regular operation of forty-six cars of the type developed in Chicago has demonstrated the design to be practical and to offer a number of desirable operating features. A method of studying and analyzing passenger movements in the development of car design to fit service requirements, or of fitting cars to service with only few traffic observations, is given.

SUFFICIENT experience has been had in the operation of the automatic exit door, double-truck, one-man safety cars designed by the Chicago Surface Lines, so that their practicability has been established. Forty-six of these cars have now been in operation over an extended period in regular service on various lines.

The construction of these cars was described in the ELECTRIC RAILWAY JOURNAL of Jan. 14, 1922; and the automatic exit door was further treated in the issue of Sept. 30, 1922. The first car of this type was put into actual service in March, 1922, and the addition of the remaining forty-five cars started in the fall of that year. They have been distributed over a number of lines in the city where conditions were considered suitable for one-man operation.

Comparing these cars with the single-truck, single-doorway type of one-man car, of which the company had ten in operation for some time, their superiority in appearance, comfort to passengers and suitability to general service conditions in a large city was at once noticeable. The more liberal provision for the movement of passengers within the car, combined with the arrangement for simultaneous loading and unloading through door openings of generous dimensions, and with the further encouragement to rapid movement of passengers offered by low steps, enabled these cars to go into service on the same schedules as had been operated with the smaller cars, despite the fact that they have a seating capacity of fifty passengers and a considerably larger total rush-hour capacity. The automatic exit door has provided a method of obtaining the advantages of free and uninterrupted simultaneous interchange of passengers without slowing down the passenger movement by the use of any form of barrier in the passageways. At the same time, this arrangement, without imposing any additional duties on the car operator, has effectively safeguarded fare collection by preventing passengers from boarding through the exit doorway. The combination of this door control with the usual safety devices and the arrangement for facilitating loading operations at terminals and for balancing all doors at both ends of the car in emergency are features that were soon found to function with entire satisfaction under actual operating conditions.



Simultaneous Interchange of Passengers, Showing Automatic Exit Door Closing as Alighting Passenger Clears Step

The car body, though built for minimum weight consistent with rigidity and strength, was also designed to withstand wear and tear of service and certain types of collisions without demolition of the vestibule and consequent excessive repair costs. It has been subjected to some severe tests and has met all of the requirements of substantial, conservative design. The exit-door mechanism was developed with simplicity and ruggedness in mind in order to assure minimum adjustments and maintenance in service. It has also demonstrated, after continuous operation through a winter of extremely adverse weather conditions, that the fundamental requirements for such a device were properly anticipated.

This device accomplishes what may on first description appear to be a number of complicated functions. But as the result of persistent study of the original installation on full-sized models, it was simplified to a very few simple and rugged parts. The treadle in the platform floor is made of safety tread material and is arranged so that it is self-cleaning to prevent

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*At the time this article was written Mr. Gordon was engineer of equipment Chicago Surface Lines.

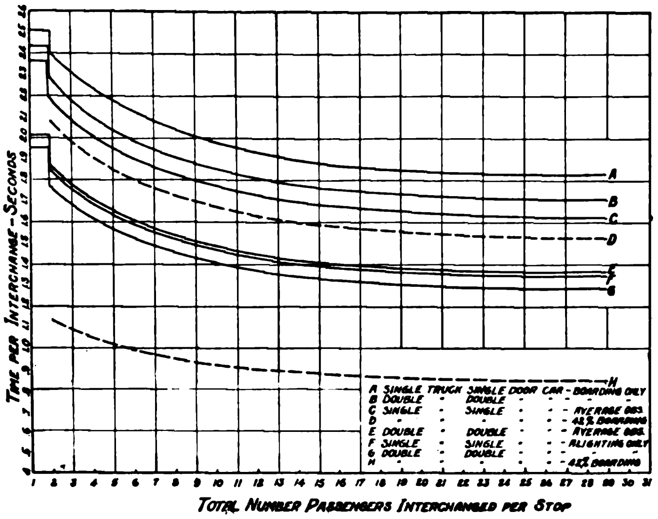


Fig. 1—Time Consumption for Passenger Interchange for Single and Double-Door Cars

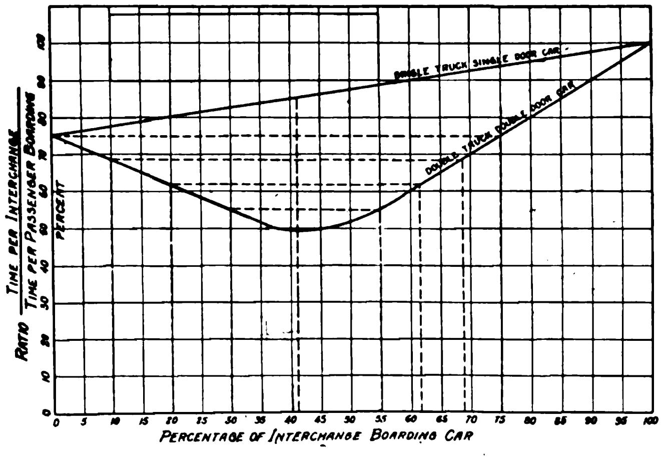


Fig. 2—Comparison of Passenger Interchange Efficiency Under Varying Percentages of Boarding Passengers

clogging with ice, snow or mud. The valve of the door engine mounted overhead is actuated from the treadle by a steel rod extending up through the stanchion which separates the entrance and exit passages. The exit door is prevented from opening until the proper time by a small, simple air cylinder tapped into the opening pipe of the entrance door engine, and the selective control of entrance and exit door is accomplished by providing an additional port in the M-28 brake valve. In addition to the simplicity in design, all of the parts of the device are permanently pinned in place, and as the motion of these parts is extremely small, little evidence of wear in the mechanism can be discovered after more than a year of service.

In order to compare the effect of the door arrangement on the time of passenger movement of these cars with that of the single-truck cars provided with a single doorway, a series of observations was made on the two types of cars running on the same line under similar conditions. For each set of observations, the cars compared were operated on the same run by the same operator. The data were collected over a large number of trips, so as to eliminate as far as possible any slight inaccuracies in individual observations. The observations were made by men stationed on the cars and equipped with stop watches for recording the length of stop required for passenger interchange. In order to keep the data collected on the two types of cars on a comparable basis, this time was carefully separated from time consumed in delays due to traffic interference. The time of leaving and arriving at terminals was noted, and the number of passengers boarding and alighting at each stop was counted and recorded.

The original data were collected on simple forms and worked up into trip averages and finally into daily averages. In an accompanying tabulation the results of observations taken over a period of twenty-one days are recorded for 118 half-trips of the double-truck car and 114 half-trips of the single-truck car.

It will be noted from the general average figures that the schedule speed on this particular line is approximately 14 m.p.h. with approximately four and one-half stops per mile. It is also interesting to note in the tabulation that although the schedule speed maintained with the double-door unit was within 4 per cent of that maintained by the single-door unit, the average passenger interchange handled was 17 per cent higher on the double-truck than on the single-truck car.

Although the data on this particular line represent outlying residential feeder service in which the number of stops per mile is quite low, some of the double-door cars are in service on lines operating through more congested districts where the stops per mile are considerably higher. The line selected was used for these observations in order to allow operation of both the single-door and double-door cars on the same run, so that conditions would be closely comparable.

The data compiled are of general interest, but although the cars were run on the same line, over the same routes and by the same operator, there are still included in these average data several important variables. Therefore, in order to eliminate these variables and obtain an accurate comparison of the effect of door construction and arrangement on the speed of passenger movement, a further analysis of the data was undertaken.

Comparative Time per Passenger Interchange Analyzed

This analysis quickly demonstrated that the time per passenger movement varied materially with two important factors—first, the total number of passengers interchanged at a given stop, and second, the direction of the passenger movement; that is, boarding or alighting. When the passenger movement includes both boarding and alighting, the time of stop is materially affected by variations in the number boarding as compared with the number alighting, even where the total number of passengers interchanged is the same.

In the following discussion, the term "number of passengers interchanged" is used to indicate the sum of the number of passengers boarding and those alighting at a given stop. The "time per passenger interchange" is therefore the total time of the given stop divided by the "number of passengers interchanged," or is the time of stop per passenger movement (either on or off) for any combination of passengers on and off. The effect of the arrangement of car platform, doors and steps on the time per passenger interchange is a measure of the merits of the design from the standpoint of rapidity in loading and unloading passengers.

It is almost apparent that the time per passenger interchange will be materially affected by the number interchanged at any stop, and will decrease as the number of passengers interchanged increases. This is the first factor referred to above and may be called the "quantity factor." Careful study of the data accumulated also shows that on each of these cars the time for passengers to alight is approximately 75 per cent of the time to board on the same car. It is therefore again evident that various combinations of passengers boarding and alighting will have a material effect on the "time per interchange." This is the second factor referred to above and may be called the "directional factor." By analyzing the effect on the time per passenger interchange of variations in the quantity factor and the directional factor for each of the two cars under consideration, a complete comparison between the two cars may be made for any combination of passenger movements.

Curves *A* and *B* in Fig. 1 are plotted from the data collected, to show the time per passenger for various numbers of passengers to board the single-truck and the double-truck cars, respectively. Likewise, curves *F* and *G* show the variations in the time per passenger to alight from each car. The time per passenger to alight, in curves *F* and *G*, is approximately 75 per cent of the time per passenger boarding for the corresponding car as shown by curves *A* and *B*.

An average of all of the data collected on each car for various numbers of passengers interchanged per stop is shown in curve *C* for the single-truck car and curve *E* for the double-truck car. These two curves show the variation in time per interchange in seconds for varying total interchanges at individual stops, without regard to the direction of passenger movement. They are presented simply to show the average of actual results obtained under the conditions existing at the time and on the particular line which is represented by the data collected. The curves shown in Fig. 1 illustrate clearly the effect of the quantity factor on the time per passenger interchange on each car, both for passenger movements in each direction separately, and also for the average of all conditions encountered in the observations.

DIRECTIONAL FACTOR DEFINED

The curves in Fig. 2 were prepared for the purpose of studying the variations in the directional factor and determining the comparative effect of such variations on the time per passenger interchange for each type of car. To make this comparison, it was necessary to arrive at some means of expressing variations in the directional factor quantitatively. If, in any combination of passengers on and off, the number boarding is expressed as a percentage of the total number interchanged, a ready means of accomplishing this is obtained. To illustrate with a concrete example, we may obtain for a total interchange of ten passengers the following combinations of passengers on and off, and if the directional factor is expressed as the ratio of the total number boarding to the total number interchanged, the result will be as shown in the table below.

A directional factor of 0 represents all passengers alighting, and a directional factor of 100 per cent represents all passengers boarding. Curves *A* and *B* in Fig. 1 therefore represent the variations in time per interchange on the single-door and double-door cars, respectively, when the directional factor is 100 per cent; and curves *F* and *G* represent the conditions when the directional factor is 0. It is then a simple matter to determine the effect on each car of other values of the directional factor between these two limits.

Total interchange	10										
Number of passengers boarding	0	1	2	3	4	5	6	7	8	9	10
Number of passengers alighting	10	9	8	7	6	5	4	3	2	1	0
Percentage of total interchange represented by passenger boarding (directional factor)	0	10	20	30	40	50	60	70	80	90	100

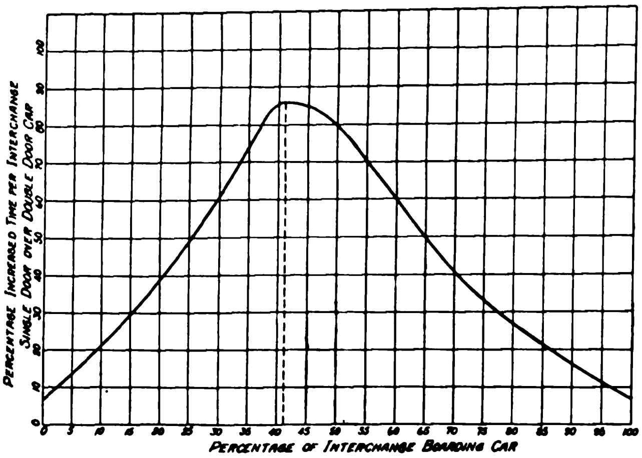


Fig. 3—Excess Time per Interchange of Single-Door Car as Against Double-Door Car for Varying Percentages of Boarding Passengers

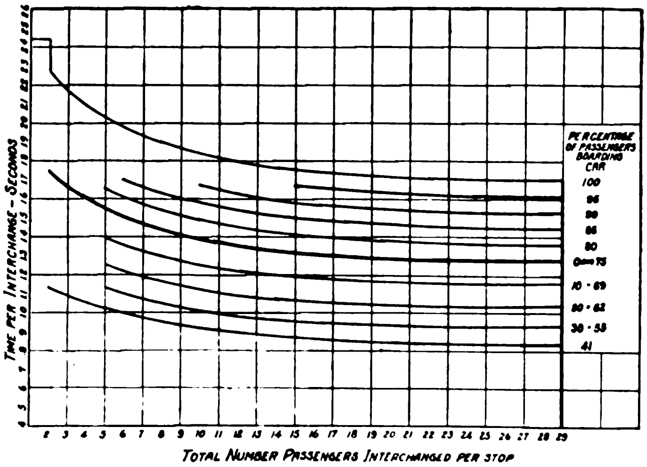


Fig. 4—Combined Effect of Number and Direction of Passengers on the Time per Interchange for Double-Door Car

On the double-truck car when passengers are boarding and alighting, the movement requiring the shorter time will be completed before the movement in the opposite direction, and consequently the total time of a stop will be the time for this second movement to be completed. The time per interchange, however, will be this total time of stop divided by the sum of the number of passengers boarding and alighting. As an example, if we assume eight passengers to be boarding and two alighting, the total time of stop will be the time for eight passengers to board. The two alighting passengers will have left the car during this time. The time per passenger interchanged will then be the time for eight passengers to board, divided by ten.

From curves *B* and *G* in Fig. 1, the time for any number of passengers to board and alight, respectively, may be determined by multiplying the time per passenger obtained from the curves by the number of passengers. In any combination, the time of stop on the double-truck car is the greater of the two values obtained, whether this is for the passengers boarding or alighting, since the movement in the opposite direc-

COMPARISON OF LOADING CHARACTERISTICS OF ONE-MAN CARS; GENERAL OPERATING DATA FROM OBSERVATIONS

DOUBLE-TRUCK CAR—DOUBLE DOORS—AUTOMATIC EXIT

		Operating Time					Time of Stops									
		Running		Stops*			Passengers		Traffic							
Date	No. of Half-Trips	Seconds	Per Cent	Seconds	Per Cent	Total Seconds	Seconds	Per Cent	Seconds	Per Cent	Total Seconds	Total Miles	Total Number of Stops	Stops per Mile	Schedule Speed, M.P.H.	Total Pass. Interchange
4/ 9/23	6	4,144.8	92.5	340.2	7.5	4,485	290.5	85.5	49.7	14.5	340.2	17.76	63½	3.57	14.26	149
4/ 9/23	8	5,617.6	87.1	832.4	12.9	6,450	640.3	77.0	192.1	23.0	832.4	23.68	112	4.73	13.22	402
4/11/23	13	9,454.0	87.9	1,301.0	12.1	10,755	991.6	76.3	309.4	23.7	1,301.0	38.48	179	4.65	12.88	725
4/12/23	7	5,058.3	88.7	641.7	11.3	5,700	521.7	81.8	120.0	18.2	641.7	20.72	90	4.35	13.10	330
4/13/23	8	5,516.5	90.1	678.6	10.9	6,195	504.6	74.4	174.0	25.6	678.6	23.68	108	4.56	13.78	258
4/16/23	16	11,287.4	88.9	1,402.6	11.1	12,690	1,125.5	80.3	277.1	19.7	1,402.6	47.36	217½	4.59	13.42	677
4/17/23	16	10,441.5	88.0	1,423.5	12.0	11,865	1,078.5	76.8	345.0	23.2	1,423.5	47.36	209½	4.42	14.37	553
4/20/23	6	4,080.6	87.3	599.4	12.7	4,680	501.1	83.6	98.3	16.4	599.4	17.76	84½	4.75	13.68	341
4/21/23	8	5,871.8	94.1	368.2	5.9	6,240	259.6	70.5	108.6	29.5	368.2	23.68	94	3.97	13.64	168
4/21/23	8	5,696.1	89.6	663.9	10.4	6.360	531.1	80.0	132.8	20.0	663.9	23.68	118	4.98	13.41	330
4/24/23	11	7,572.9	91.9	662.1	8.1	8,235	522.5	79.0	139.6	21.0	662.1	32.56	142	4.36	14.23	285
4/25/23	11	7,604.9	88.3	1,011.1	11.7	8,616	831.3	82.3	179.8	17.7	101.1	32.56	165	5.07	13.60	538
						SINGLE-TRUCK CAR—SINGLE DOOR										
4/23/23	11	7,246.1	92.2	613.9	7.8	7,860	506.1	82.5	107.8	17.5	613.9	32.56	142	4.36	14.91	262
4/23/23	16	10,791.9	87.9	1,493.1	12.1	12,285	1,222.8	81.9	270.3	18.1	1,493.1	47.36	212	4.47	13.89	581
4/26/23	12	7,847.5	90.6	822.5	9.4	8,670	658.0	80.0	164.5	20.0	822.5	35.52	153½	4.32	14.75	338
4/26/23	15	10,535.9	86.6	1,629.1	13.4	12,165	1,354.0	83.3	275.1	16.7	1,629.1	44.4	232½	5.24	13.12	738
4/27/23	10	6,478.6	91.3	616.4	8.7	7,095	413.9	67.2	202.5	32.8	616.4	29.60	120½	4.07	15.03	193
4/27/23	13	8,843.2	88.4	1,161.8	11.6	10,005	894.7	77.0	267.1	23.0	1,161.8	38.48	190	4.94	13.85	483
4/28/23	21	14,001.1	89.6	1,628.9	10.4	15,630	1,304.7	80.1	324.2	19.9	1,628.9	62.16	269	4.33	14.31	724
4/28/23	7	4,879.8	88.7	625.2	11.3	5,505	516.8	82.7	108.4	17.3	625.2	20.72	96	4.64	13.55	304
4/30/23	9	5,958.4	88.9	746.6	11.1	6,705	627.0	84.0	119.6	16.0	746.6	26.64	125½	4.71	14.30	331

	Double-Truck Car	Single-Truck Car
Average interchange per stop..	3.00	2.57

* Exclusive of layovers.

tion, being carried on simultaneously, is completed before this time. In each case the time per interchange may be found by dividing the time of stop by the sum of the number on and off. In this way any number of points may be obtained for various values of the directional factor by expressing this factor in terms of the percentage which the number boarding represents of the total number interchanged. These percentages are used as the horizontal values or abscissa in Fig. 2.

DIRECTIONAL FACTOR SEGREGATED

The vertical values, or ordinates, in this diagram could be plotted as the time per passenger interchange for each value of the directional factor. The time per interchange, as is shown in Fig. 1, however, also varies with the number interchanged, or the quantity factor. As was shown in the discussion of Fig. 1, the time per passenger off is approximately a fixed percentage (75 per cent) of the time per passenger for the same number to get on, regardless of the number, and consequently if the time per passenger interchange, as obtained in the preceding paragraph, is divided by the time for the same number of passengers to board the car, the result is a fixed percentage for any given value of the directional factor, regardless of the number of passengers involved. In this way the relative variations in the time per interchange may be studied for various relative values of the directional factor only, and therefore the curve for the double-door car in Fig. 2 was prepared in this manner.

A similar curve was also prepared for the single-door car, but with a slight difference in procedure due to the difference in the door arrangement. On the single-door car there is no provision for simultaneous movement of boarding and alighting passengers, and consequently the passengers desiring to board the car must wait until those desiring to leave have all alighted. As a result, the total time of stop will be the sum of the time required for passengers to board and alight. With this change in procedure, the curve in Fig. 2 for the single-door car was prepared from curves *A* and *F* in Fig. 1 in a manner similar to that explained above for the preparation of the curve for the double-door car shown in Fig. 2.

These curves represent not only the result of the theoretical combination of the conditions described, but also the results obtained by plotting, for corresponding combinations of conditions, the actual data obtained in the observations on the cars in service. From the curve for the double-truck car it is apparent that when the number of passengers boarding at any given interchange is equal to approximately 41 per cent of the total number interchanged, the time per interchange is a minimum. At this point, the time per interchange is approximately 49½ per cent of the time per passenger for the same number of passengers to board the car. For the single-truck car with single doorway, the corresponding value of time per passenger is 85½ per cent of the time for the same number of passengers to board that car. At this point, the saving in time for the double-door car is a maximum as compared with the single-door car, and decreases as the proportion of passengers boarding varies either up or down from the 41 per cent value.

DOUBLE-DOOR CAR HAS WIDER APPLICATION

A curve showing the relative values of this difference between the time per interchange for the single-door and the double-door cars, expressed as a percentage of the time per interchange for the double-door car, is shown in Fig. 3 for various combinations of passengers boarding and alighting. This curve expresses completely the relative difference in time per passenger interchange on the two cars for various values of the directional factor, and is therefore a true comparison of the merits of the two-door arrangement, from the standpoint of facilitating passenger movement. The comparatively large difference in time for passenger movement in favor of the double-door car makes this car applicable to a considerably wider range of city service conditions, where the single-door unit cannot be efficiently used, and where the requirements are still below that of the heavy trunk lines for which larger two-man units must be provided.

The curves in Fig. 4 were prepared as a matter of interest, in that they show completely, for the double-door car, the combined effect of the quantity factor and the directional factor on the time per passenger interchange. A diagram similar to the one shown in this figure may be used in scheduling cars for the purpose of predicting the total time allowance on a given line for the interchange of passengers. To do this requires only a simple set of observations on the line under consideration, in order to determine the passenger characteristics for that line, which will give a record of the number and direction of passenger movements at each stop, without regard to the time for these movements. A diagram similar to Fig. 4 may be prepared for any car under consideration and the effect of using this car on the particular line may be predicted by applying to the car diagram the passenger data collected, and determining therefrom the total time allowance for the movement of passengers. This was done with the data collected from these observations without regard to the time of stops, and the computed total time of stop thus obtained checked within a few per cent of the actual time recorded. The primary advantage of the method is that once the characteristics for a type of car are determined, the labor and time of collecting a large number of stop watch readings to eliminate personal errors may be saved.

AUXILIARY MANUAL CONTROL OF EXIT DOOR

In the construction of the automatic door as applied to the double-truck safety cars in Chicago, an auxiliary manual control for the exit-door engine has been provided for the car operator, enabling him to open the exit door independently of the treadle device. This auxiliary control is interlocked, however, so that the door cannot be opened until after the brakes are applied, and is also arranged so that the door is closed by the release of the brakes without the necessity for any further attention to the auxiliary handle. This auxiliary device was provided primarily to facilitate terminal loading, where it is sometimes desirable to load passengers through both doorways. But it has been found in practice that the car operators make use of this control to speed up the loading of passengers at heavy loading points along the line, particularly where a large proportion of transfer traffic is encountered. This feature further speeds up passenger movement in comparison with the single-door car, but is not taken into consideration in the results herein presented, as the data compiled includes only normal interchanges using the entrance and exit doorways independently, with the automatic exit door in full operation at all stops.

Passenger Compartment at the Front in Combination Cars

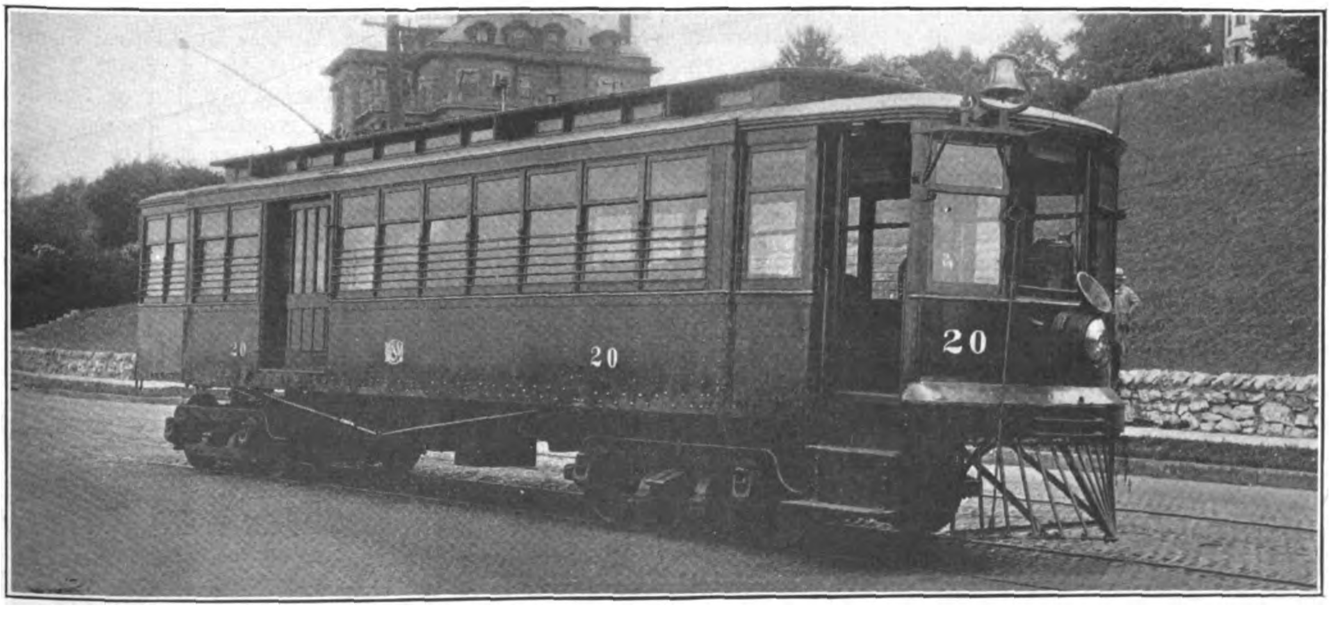
The Tri-City Railway Is Rebuilding Standard City Cars for Interurban Service—Special Attention Is Being Given to the Comfort of Passengers

IT IS the intention of the Clinton, Davenport & Muscatine Railway soon to replace the present two-man cars by cars rebuilt for one-man operation. These will be the present standard city service cars of the Tri-City Railway Company, rebuilt for one-man interurban operation but using the same motors and trucks as are now under the cars.

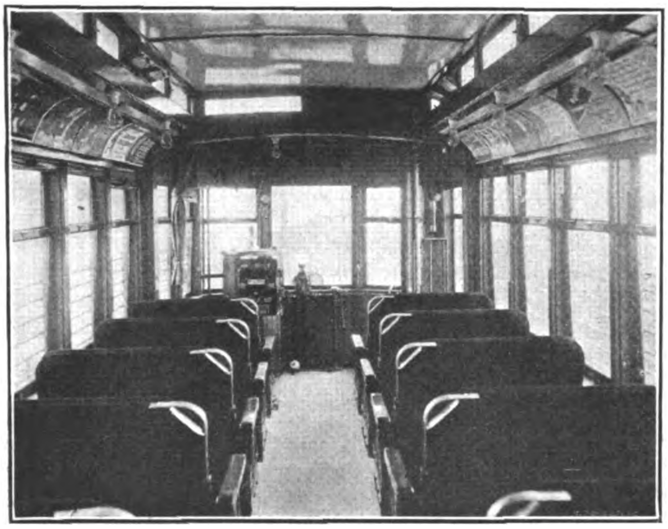
The company feels that sufficient attention has not been paid in the past to making the ride as pleasant as possible for the passengers. In redesigning these cars, therefore, particular emphasis has been given to this feature. The passenger compartment of the combination car will be placed at the front, with the baggage compartment in the center, and a smoking compartment at the rear. At the back of the passenger compartment will be a toilet and a small closet for an oil heater. This heater will be used for emergency only, in case of power failure. Formerly this type car was equipped with a hot water heating system, but this is now being taken out and electric heaters are to be installed for normal operation.

The headlining of the car is painted white, and every effort has been made to secure an attractive interior finish. The exterior of the car is painted light maroon in color, partly in order to insure visibility and partly for looks. Great care has been taken to provide sufficient artificial illumination so that it will be easy for a passenger to read in any part of the car even if the voltage drops somewhat below normal. In the passenger compartment the seats are covered with green plush, and in the smoking compartment they are covered with Pantasote. Linoleum is used for floor covering. The smoking compartment has been arranged as a sort of observation compartment, and an attempt has been made to give it a somewhat "clubby" effect.

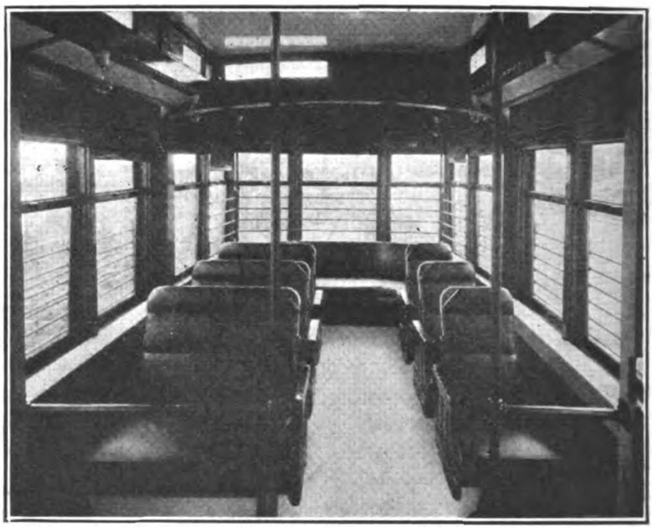
The old 1,200-volt drum controller has been replaced by Westinghouse HL control, this being considered



Standard City Car Rebuilt for One-Man Operation



Passenger Compartment Seats Are Covered with Green Plush



Smoking and Observation Compartment

somewhat safer. Another reason for this change was the fact that the HL controller will obscure the forward vision of the passengers less than would the old drum controller. The rebuilt cars are to be equipped with standard one-man safety devices which operate better with the HL control than they do with the drum control, although they can be, and in fact on the city line they have been, adapted to the latter.

The platforms of the standard city cars before being rebuilt in this way for one-man interurban operation were several inches lower than the car floor. In order to permit the trucks of the rebuilt car being placed at wider centers, the platforms have been reconstructed flush with the car floor. Another reason for doing this was to secure standard M.C.B. height for the bumpers and thus to prevent telescoping in case of collision.

Prior to putting these cars in service a test was made by the railway to determine whether or not the riding qualities were satisfactory. For the purpose of making this test before the HL equipment had been delivered, one of the large 1,200-volt drum controllers was temporarily connected up. This controller was still in place when the photograph at the top of this page was taken. The trucks are equipped with graduated springs, and this feature, together with the increased wheelbase, was found to produce a very easy riding car. Moreover, the speed has been increased about 15 per cent. These rebuilt city cars weigh approximately 37,000 lb., as compared with 65,000 lb. for the present cars.

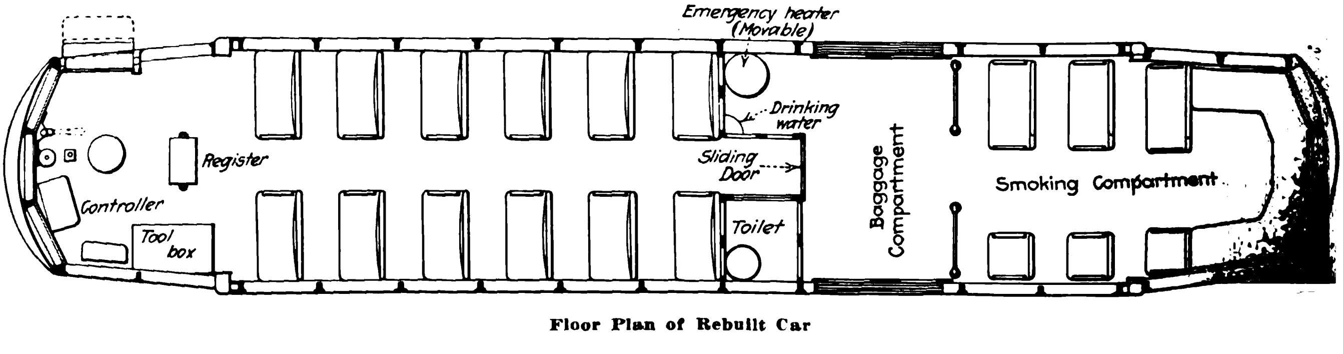
The company has already replaced the 80,000-lb. cars on the Mason City Clear Lake Railroad by similar light-weight rebuilt cars. There is the difference, however, that the 600-volt motors and trucks are allowed to remain, because the Mason City line operates at that voltage. The control arrangement will be the same as is now used. On account of the shortness of this line, the toilet and emergency heating arrangement have been omitted from the cars rebuilt for that service. These cars are being geared for a speed of 50 m.p.h., and it is expected that the scheduled speed on that line will be nearly doubled. Thirty-minute service will then be given in place of the present hourly service. There will be no change, however, in the present 1½-hour schedule on the Muscatine division of the C. D. & M.

Six of the standard city cars of the Tri-City Railway are being rebuilt for the purposes outlined. The Mason City cars are already in service, and the cars for the Muscatine division were completed about Aug. 1. Double-truck cars weighing about 25,000 lb. each have been bought to replace them. They have already been described in the ELECTRIC RAILWAY JOURNAL. For rebuilding cars on which the controller will remain unchanged, the cost is $2,800 per car. An additional outlay of $1,400 per car will be necessary to install HL control on the Muscatine division.

A 2½-Cent Fare in Lynn

THIS summer the Eastern Massachusetts Street Railway has put on a run for which a fare of only 2½ cents is charged, that is, a fare of 5 cents is charged for the round trip. The route is between Central Square, Lynn, and Lynn Beach, a distance of about ¾ mile. Usually one car can give the service, but on Sundays or other busy days two are required. The passenger pays 5 cents for his ride, but is entitled to a return ticket without charge. The money is collected in a Johnson box and the return tickets in a Cleveland box.

The car runs only on pleasant days, and the business is primarily in summer only.



Floor Plan of Rebuilt Car

Economic Fields of Trolley Car and Bus

Cost of Urban Transportation by Means of Double-Truck and Safety Cars, Trolley Buses and Auto Buses Compared—Paving Maintenance an Item That Must Be Considered—Including This, Rail Cars Appear Best for Medium and Heavy Traffic

By Victor Topping

Engineer of Traffic Analysis, Toronto Transportation Commission

URBAN transportation is a natural monopoly, and experience has shown that only chaos results from the destructive competition of transportation agencies. Granting this, the controlling factor in the choice of a means of transportation for a particular case is density of traffic. If traffic be light the unit cost of service may be kept within a reasonable limit only by low investment charges, even at the cost of fairly high operation charges. As the density increases the investment expenses may be greater, with the object of reducing operation expenses and in this way lowering the total unit cost of transportation.

OPERATING CHARGES FAVOR TROLLEYS

Considering for the present the tools of surface transportation alone, electric railway, trolley bus and auto bus, it will be recognized that investment charges are in the order mentioned, commencing with the highest. Operation charges are in the reverse order, the cost per bus-mile for the auto bus being very considerably greater than the cost per car-mile for the electric car.

J. C. Thirlwall of the General Electric Company has presented valuable analyses of the relative cost of these three forms of city transportation, several of which have appeared in ELECTRIC RAILWAY JOURNAL and *Bus Transportation.* In a paper in the *General Electric Review* for December, 1921, his conclusions are that:

1. Where minimum headways required are three minutes or less, the rail car is most economical.
2. From three- to six-minute headways the rail car and trolley bus are equally economical.
3. For headways of six to sixty minutes the trolley bus is most economical.
4. For greater headways than sixty minutes the gasoline bus is most economical.

TABLE I—COMPARISON OF VEHICLES

	—Electric Double-Truck	Cars— Safety	Trolley Bus	Auto Bus
Seats	55	32	30	30
Weight, pounds	45,000	18,000	13,000	10,000
Operation charges, cents per vehicle-mile:				
Maintenance and renewals of way and structures	3.9	2.5	10.0	7.5
Maintenance and renewals of equipment	4.8	2.5	6.0	11.0
Power	4.3	2.5	2.5	6.0
Platform expense	14.0	7.5	7.5	7.5
General and miscellaneous	6.0	6.0	6.0	6.0
Total operating charges	33.0	21.0	32.0	38.0
Fixed charges, per cent of total investment:				
Interest	8.0	8.0	8.0	8.0
Obsolescence and inadequacy	1.5	1.5	3.0	4.0
Taxes	2.0	2.0	2.5	2.5
Total	11.5	11.5	13.5	14.5

An examination of the data on which these conclusions were based constrains the writer to suggest considerable modification, and to show that the above is not altogether a fair comparison, the forms of trackless transportation being too highly favored.

Mr. Thirlwall's figures do not take into account the wear of the roads by buses. Even when no commensurate charge is made to the transportation agency for the use of the city roadways, the cost is borne by the public in the form of taxes, so that the ultimate economic comparison must take maintenance of roads into account.

COST OF DAMAGE TO HIGHWAYS BY BUSES

As to the amount of damage which buses cause to public highways, a report presented in 1922 at the Chicago convention of the American Electric Railway Association, by the committee appointed to consider motor-bus and truck transportation, states the cost of deterioration of highways by pneumatic-tired vehicles to be 1 cent per ton-mile and 1½ cents per ton-mile by solid-tired vehicles. These figures were obtained by an extensive investigation of information supplied by state highway commissions in various parts of the United States. The committee recommended these rates, with the admonition that they are not the result of accurate data. The belief is expressed that more accurate studies will necessitate a revision, if any, in the upward direction.

The costs given in Table I were obtained from a study of the operating and financial statistics of a large number of electric railway and several trolley-bus and auto-bus systems, being fairly representative of average conditions in America. The writer has followed the principle mentioned in the first chapter of the committee report with regard to depreciation, i.e., each system is assumed to be maintained at a set standard of excellence, all expense of maintenance and renewals contingent thereto being charged directly to operation accounts. In addition, an item for "obsolescence and inadequacy" is added to the fixed charges.

This analysis of unit costs is based on the ultimate economy as regards the individual passenger, who pays the piper in the long run; hence the item for maintenance and renewals of way and structures in the case of the trackless vehicles includes 1.5 cents per ton-mile or 7.5 cents per passenger car-mile for a vehicle weighing 10,000 lb.

By this procedure, and by transferring a considerable portion of depreciation expense from fixed to operation charges, as stated above, considerable divergence

TABLE II—AVERAGE COSTS OF CONSTRUCTION AND EQUIPMENT—CANADA

Single track in paved streets, per route-mile	$75,000	to	$100,000
Double track in paved streets, per route-mile	150,000	to	225,000
Distribution line, per route-mile	6,000	to	8,000
Transmission line, per route-mile	2,500		
Generating station, per maximum kilowatt output	150		
Substation, per maximum kilowatt output	50	to	60
Shops, per car used	2,000	to	3,000
Fifty five-passenger double-truck cars	18,000		
Thirty two-passenger safety cars	10,000		
Thirty-passenger trolley buses	11,000		
Thirty-passenger auto buses	10,000		

TABLE III—COMPARATIVE COSTS OF SERVICE PER ROUTE-MILE FOR A COMPLETE SYSTEM OF LENGTH 5 MILES

			Cost of Service, Dollars per Route-Mile							
			Neglecting Wear on Road Surfaces				Including 1.5 Cents per Ton-Mile for Roadway Maintenance			
	Headways, Minutes									
Type of Vehicle	Base	Rush	Double-Truck Car	Safety Car	Trolley Bus	Auto Bus	Double-Truck Car	Safety Car	Trolley Bus	Auto Bus
All	60	60	....	$12,480	$5,070	$4,700	....	$12,480	$6,250	*$5,690
All	30	30	....	15,660	7,590	9,060	....	15,660	*10,960	11,030
All	15	15	....	22,590	15,620	17,790	....	22,590	*20,350	21,730
Safety car	15	10	....	24,300	20,600	23,000	....	*24,300	26,300	27,700
Bus	15	6.7								
Safety car	8	4	....	50,160	45,690	52,190	....	*50,160	58,630	62,990
Bus	8	2.7								
Double-truck car	6	3	$93,200	93,600	110,300	126,500	*$93,200	93,600	141,400	152,400
Safety car	3.5	1.6								
Bus	3.33	1.1								
Double-truck car	3	1	209,300	223,200	300,800	341,500	*209,300	223,200	380,000	407,500
Safety car	1.7	0.54								
Bus	1.6	0.37								

* Indicates most economical form of transportation, including roadway maintenance.

results from the economic relationships of the three agencies of transportation as shown by Mr. Thirlwall

The costs of construction and equipment given in Table II are based on prices in Canada. Costs in the United States should be about 20 per cent to 30 per cent lower. The cost per route-mile of track includes cost of special trackwork at intersections and turnouts. At intersections one-half of the cost of special trackwork is included, the remainder being borne by the intersecting line. While the cost of construction varies greatly in different localities, the figures suggested are fairly representative of average conditions.

Using these costs of equipment and of providing service, a series of economic comparisons for the different types of surface systems has been computed in a fashion somewhat similar to that used by Mr. Thirlwall. Costs are estimated on a completely-equipped line 5 miles long, for very widely varying headways, ranging from those which would obtain in the most sparsely-settled districts to the headways necessary in densely-populated cities. All costs are reduced to a route-mile basis.

A summary of the total costs per route-mile of service for electric car, trolley bus and auto bus for the different headways will be found in Table III. The costs for the trackless vehicles take into account the wear of road surfaces, to give a more fundamental economic comparison. In addition, as a matter of interest, the summary also shows the costs if this wear of road surfaces be neglected.

The detailed analyses for the different densities of traffic will be found in Table IV. These tables are all based on a route 5 miles long, single track being used for light traffic and double track for medium and heavy traffic. The schedule speed for all except the very heavy city traffic has been assumed 10 m.p.h., making the time allowance for the round trip sixty minutes. In the case of the very heavy traffic the schedule speed for the double-truck car has been taken as 9 m.p.h., making the round trip time 66.7 minutes, while for the safety cars and buses the schedule speed is 8.5 m.p.h. and the time allowance seventy minutes.

SURFACE TRANSPORTATION—CONCLUSIONS

An examination of Table IV indicates the following facts with respect to the economic fields of electric car, trolley bus and auto bus in urban passenger transportation, assuming the ultimate economy to the individual passenger; that is, taking into account the wear of roads by trackless vehicles.

1. *Normal headway, three minutes or less (double-truck cars):*

The most modern double-truck two-man electric car, such as the Peter Witt type, is most economical. Conditions here obtain in the larger cities, where rush-hour loading will often necessitate carrying passengers at six times or more the normal rate.

Apart from the impracticable rush-hour headways necessary to provide the same accommodation by means of trolley bus or auto bus, viz., twenty-two seconds, the cost of providing service by these trackless vehicles is about 100 per cent greater than for double-truck cars, making them entirely unsuitable for mass transportation of this kind. The safety car is slightly more costly than the double-truck; the peak headway necessary (thirty-two seconds) makes its use undesirable.

TABLE IV—COMPARATIVE STATISTICS OF URBAN PASSENGER SERVICE WITH TROLLEY CARS,

	Headway, Minutes		Hourly Passenger Capacity		Vehicles Required, with Spares		Annual Vehicle-Miles			
	Base, 13-Hr.	Rush, 5-Hr.	Base	Rush	Total	Per Route-Mile	Total	Per Route-Mile	Track	Overhead System
Very light traffic all day										
Safety cars, thirty-two seats	30	30	64	130	3	0.6	131,400	26,300	$70,000	$8,500
Trolley buses, thirty seats	30	30	60	90	3	0.6	131,400	26,300	....	9,000
Auto buses, thirty seats	30	30	60	90	3	0.6	131,400	26,300	....	.....
Light traffic all day										
Safety cars, thirty-two seats	15	15	128	260	5	1.0	262,800	52,600	75,000	8,500
Trolley buses, thirty seats	15	15	120	180	5	1.0	262,800	52,600	....	9,000
Auto buses, thirty seats	15	15	120	180	5	1.0	262,800	52,600	....	.....
Light traffic, with peak load										
Safety cars, thirty-two seats	15	10	128	390	7	1.4	284,400	56,900	75,000	8,500
Trolley buses, thirty seats	15	6.7	120	405	10	2.0	318,000	63,600	....	9,000
Auto buses, thirty seats	15	6.7	120	405	10	2.0	318,000	63,000	....	.....
Medium traffic										
Safety cars, thirty-two seats	8	4	240	975	17	3.4	598,000	119,600	150,000	9,500
Trolley buses, thirty seats	8	2.7	225	990	24	4.8	719,000	143,800	....	10,000
Auto buses, thirty seats	8	2.7	225	990	24	4.8	719,000	143,800	....	.....
Moderately heavy city traffic										
Double-truck cars, fifty-five seats	6	3	550	2,400	22	4.4	795,000	159,000	200,000	10,000
Safety cars, thirty-two seats	3.5	1.6	544	2,405	40	8.0	1,410,000	282,000	175,000	10,000
Trolley buses, thirty seats	3.33	1.1	540	2,385	60	12.0	1,730,000	346,000	....	11,000
Auto buses, thirty seats	3.33	1.1	540	2,385	60	12.0	1,730,000	346,000	....	.....
Very heavy city traffic										
Double-truck cars, fifty-five seats	3	1.0	1,100	7,200	72	14.4	1,940,000	388,000	225,000	10,000
Safety cars, thirty-two seats	1.7	0.54	1,100	7,215	138	27.6	3,490,000	698,000	175,000	10,000
Trolley buses, thirty seats	1.6	0.37	1,110	7,200	205	41.0	4,400,000	880,000	....	11,000
Auto buses, thirty seats	1.6	0.37	1,110	7,200	210	42.0	4,400,000	880,000	....	.....

2. Normal headway, six minutes (double-truck cars): With this density of traffic there is little to choose between the two-man car and the safety car from the economic standpoint, the balance favoring the former slightly. As against this might be set the advantage of greater frequency furnished by the safety car.

3. Normal headway, eight to fifteen minutes (safety cars):

At these headways, where rush-hour conditions are found, as in small towns and the outskirts of cities, the safety car is most economical, the trolley bus ranking second.

4. All-day headway, fifteen to thirty minutes:

Under these conditions the trolley bus has undoubted sway, if economics alone be considered. At thirty minutes there is practically no difference in cost between trolley bus and auto bus.

5. All-day headway, thirty minutes or more:

Beyond headways of thirty minutes the auto bus is apparently the most economical form of urban transportation.

These results would seem to show that there is no field for the auto bus in city service, for headways greater than thirty minutes are hardly admissible in urban transportation. The auto bus may find a legitimate field in providing service where, from esthetic considerations, tracks and overhead wires would not be tolerated; and also in supplementing existing street car systems, by providing a special service for those who are willing to pay extra for it. An example of such service is that of the Fifth Avenue Coach Company in New York. In outlying districts, where headways of about thirty minutes are adequate, or even at closer headways when the final location of a route is indefinite, the use of the auto bus would seem to be proper.

The trolley bus furnishes a valuable solution of the problems of extending and developing the service of the existing electric railway into the suburbs, pending the ultimate construction of the track in the same location when traffic density is sufficiently great to warrant it.

For the problems of mass transportation presented by the main portions of our cities the modern double-truck electric car still provides the most efficient and economical answer, and where traffic conditions are less rigorous the one-man safety car fills a large field.

TROLLEY BUSES, AND AUTO BUSES

Comparative Costs per Route-Mile

Power and Sub-stations	Shops or Garages	Cars or Buses	Total Investment	Fixed Charges	Operating Charges	Total Cost
$2,500	$1,200	$6,000	$88,200	$10,140	$5,520	$15,660
2,000	1,200	6,600	18,800	2,540	8,420	10,960
....	1,200	6,000	7,200	1,040	9,990	11,030
4,800	2,000	10,000	100,300	11,540	11,050	22,590
4,000	2,000	11,000	26,000	3,510	16,840	20,350
...	2,000	10,000	12,000	1,740	19,990	21,730
7,200	2,800	14,000	107,500	12,400	11,900	24,300
9,000	4,000	22,000	44,000	5,900	20,400	26,300
....	4,000	20,000	24,000	3,500	24,200	27,700
17,500	6,800	34,000	217,800	25,050	25,110	50,160
21,000	9,600	52,800	93,400	12,610	46,020	58,630
....	9,600	48,000	57,600	8,350	54,640	62,990
52,000	13,000	79,000	354,000	40,700	52,500	93,200
44,000	16,000	80,000	325,000	37,400	59,200	93,600
53,000	24,000	132,000	220,000	29,700	111,700	141,400
......	24,000	120,000	144,000	20,900	131,500	152,400
170,000	43,000	259,000	707,000	81,300	128,000	209,300
150,000	55,000	276,000	666,000	76,600	146,600	223,200
185,000	82,000	451,000	729,000	98,400	281,600	380,000
...	84,000	420,000	504,000	73,100	334,400	407,500

Cutting Down the Operating Ratio in Terre Haute

Results Obtained Since Inauguration of Safety Car Operation in 1918—Jitney Competition Eliminated, Gross Revenue Increased, Operating and Maintenance Costs Reduced

NEARLY five years have elapsed since one-man safety car operation was inaugurated in Terre Haute, Ind. By this time operating expenses and revenues should have settled down to a stable basis because the cars now require normal maintenance and the element of novelty has long since ceased to play a part in attracting business.

To be somewhat more specific, on June 10, 1918, thirty Birney cars were ordered by the Terre Haute Traction & Light Company, and the first cars were put into service on Dec. 1 of that year. As promptly as possible 40 per cent of the city mileage was equipped with the safety cars, the daily car mileage being increased 25 per cent as the change was made.

The new cars soon demonstrated their fitness for the service, and in spite of money stringency the purchase of twenty-six additional cars was financed during the following year. Therefore, early in 1920 fifty-six cars were available for service, about fifty being required for regular schedules. By this time practically all of the forty old-type cars which had preceded the safety cars had been retired from service.

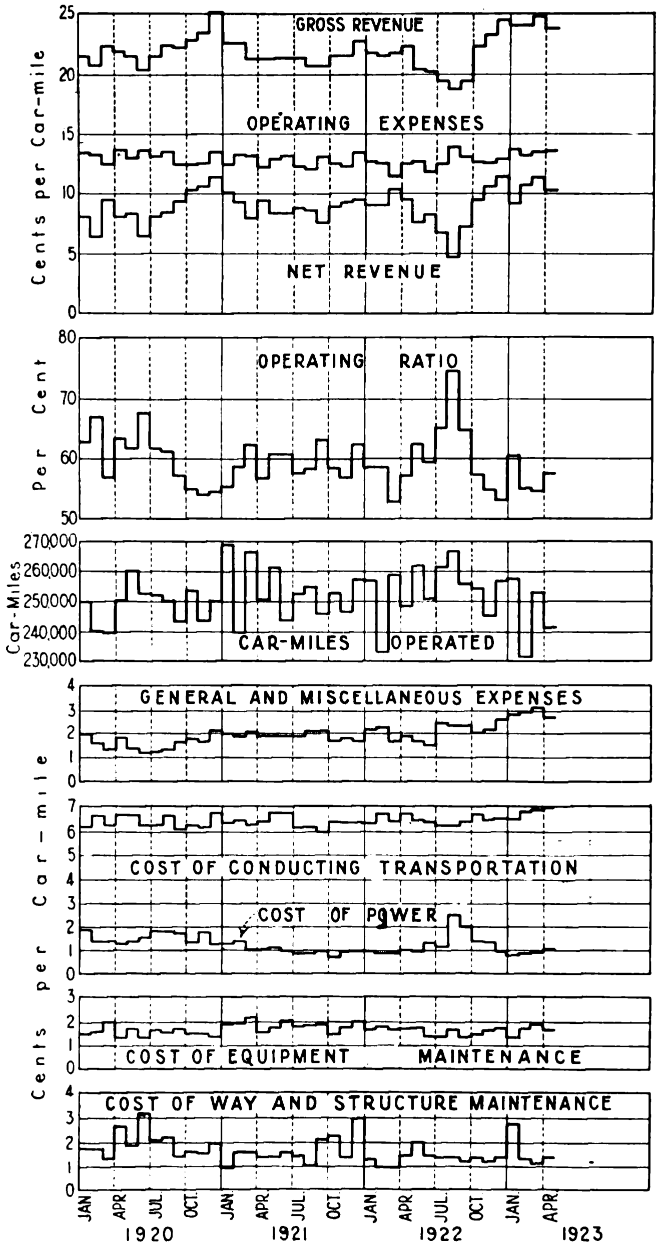
At the time the new cars arrived jitney competition was unusually severe. The effect of the improved street car service was practically to eliminate the jitney and to force what was left to go onto a 10-cent fare basis after 7 p.m. The street railway fare was and still continues at 5 cents. The new service brought a commensurate increase in traffic, due partly to its inherent qualities and partly to the elimination of jitney competition, and the traffic was soon on a profitable basis.

SALIENT FACTS DISCLOSED BY THE RECORDS OF OPERATION

A recent analysis of the operating data of the Terre Haute city lines has been made, covering the period from Jan. 1, 1920, or the entire period of practically 100 per cent safety car operation. The data have been put into graphical form, as reproduced herewith, for convenience in study. Certain facts stand out prominently in the charts, noticeably the following:

The gross revenue has held remarkably steady, fluctuating slightly with industrial conditions. The gross revenue shows a characteristic tendency toward heavier traffic in midwinter, due largely to the laying up of automobiles. A slump occurred last summer on account of the strike in the coal field; otherwise the gross revenues might almost be said to be constant from year to year.

The weekly pass was put into effect on the Terre Haute lines on May 1, 1922, and has proved increasingly popular. At the last report the sale was about 1,500 passes per week, at $1 each. This is about one per forty-five inhabitants, estimating the population of Terre Haute at approximately 68,000. In a letter published in the issue of this paper for June 30, 1923, page 1086, E. M. Walker, general manager of the company, stated that the pass revenue is the most stable part of the total revenue. Reference to the gross revenue graph



Data Covering Operation of Safety Cars in Terre Haute During Period of 100 per Cent Safety Car Operation

shows that the unfortunate slump last summer makes difficult an estimate of the effect of the pass. However, the present traffic is distinctly better than for the corresponding period last year, credit for part of which must be given to the pass.

The operating expenses are even more nearly constant showing a slight tendency downward from 1920 to 1922, with a slight tendency upward at present due to a corresponding reduction in car-miles operated.

The difference between the gross revenue and operating expenses, or net revenue, is slightly on the increase, having during the past few months twice exceeded 11 cents per car-mile. Last summer's slump in gross revenue is more than reflected in the net revenue because the same causes which operated to decrease the gross revenue increased the operating expenses.

A striking point in regard to the whole record is the gradual recession of the operating ratio, which twice last year was 53 per cent or below and for the past six months or so has averaged not far from 56 per cent. In the first half of 1920 it was twice above 67 per cent and averaged more than 60 per cent for the year.

The number of car-miles operated is remarkably uniform, the fluctuations indicated in the graph being largely due to the differing number of days in the several months.

The sixth item graphed is general and miscellaneous expense, which has shown a tendency to increase, absorbing the decreases made elsewhere, but the grand total is practically constant, as mentioned earlier. However, a contributing cause for this increase has been the high cost of accidents due to the very high wages paid in the coal fields.

There has been no substantial change in the cost of conducting transportation, which for three years has averaged about 6¼ cents per car-mile. During this time there has been no change in wages, the average wages paid to the platform men being about 42 cents per hour.

Power cost, after 100 per cent safety car operation was inaugurated, gradually fell to its present magnitude of 1 cent per car-mile, or even less. The company charges itself for electrical energy at the rate of the actual cost of production and delivery to converting machinery.

LIGHT-WEIGHT CAR MAINTENANCE COST IS NOT EXCESSIVE OR FLUCTUATING

Equipment maintenance is now running consistently at about 1½ cents per car-mile, as in 1920. The excessive prices of 1921 are reflected in the increase in this item to about 1¾ cents. The moderate cost is due to the careful organization of the maintenance work, one feature being a section of the shop set aside for testing the various parts of the safety equipment. Once a year the motors are overhauled, the armatures and ball bearings being removed, and all of the air parts taken out and overhauled. Painting is also part of the yearly schedule. The steel wheels are not lathe-turned but they are brought back to contour by what may be termed "gas turning," as described in the issue of this paper for July 21, page 104.

The effect of the light-weight cars on the way and structure maintenance is clearly brought out in the graph. Each of the past three years has brought about a reduction, the average for 1920 being 2 cents, that for 1921, 1.6 cents, and that for 1922, 1.24 cents per car-mile.

SEGREGATION OF CITY CAR OPERATING EXPENSE ITEMS

The Terre Haute division of the Terre Haute, Indianapolis & Eastern Traction Company, of which division the Terre Haute city lines form a part, operates in Terre Haute heavy interurban cars. This requires in some items of operating expenses an estimate of the proper division between interurban and city cars. The maintenance of way is charged 25 per cent to the city cars and 75 per cent to the interurban; the equipment expense is determined by the separate items; the power cost is calculated at 1.5 kw.-hr. per car-mile in winter and 1.35 kw.-hr. in summer; conducting transportation is separated by items; and general and miscellaneous is separated sometimes on a 50-50 basis, or when accident damages are high on the interurban lines, a division is made 40 per cent to the city cars and 60 per cent to the interurban cars. As these data are given on a car-mile basis, the items will fluctuate somewhat with the number of car-miles of service furnished.

Planning a Carhouse and Storage Yard

The Layout Proposed Was Made with a View to Easy and Rapid Handling—Facilities Are Provided to Eliminate Interference and Waste Movement

*By Henry S. Day**

Railway Department, Westinghouse Electric & Manufacturing Company

THE chief object that should be sought in the layout of a carhouse is ready accessibility of cars. Freedom from interference in dispatching of cars by the transportation department and delays in switching cars needed by the inspection force are essential, and necessary facilities must be provided to save time and produce good inspection and practical operation in bad weather, without subjecting the carhouse force to temperature conditions that reduce their efficiency.

The accompanying plan of a carhouse and storage yard is intended to take care of 200 cars. It is assumed that these cars will average 3,000 miles per month and that they are inspected at 1,000 miles and washed once each week. Omitting anything but emergency work on Sunday, this would require twenty-four cars per day for inspection and thirty-four cars per day for washing.

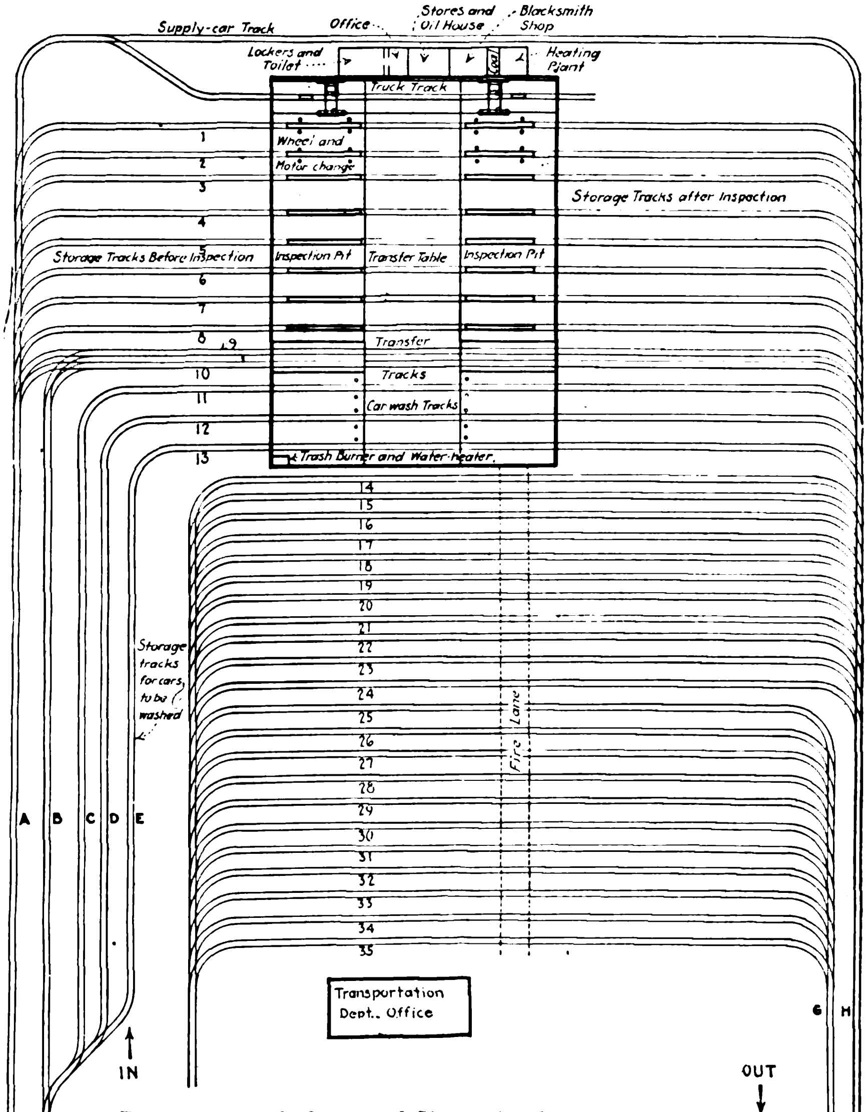
A study of the layout will show that cars due for inspection are delivered to storage tracks 3 to 8 at the west side of the carhouse, and from this point over the inspection pits to storage tracks at the east side. Tracks 3 to 8, each with two pits, have sufficient capacity to house at one time half of the twenty-four cars required for inspection. Tracks 1 and 2 are equipped with air jacks for wheel and motor changes, trucks being run out from under the cars on their own power to the transfer table, by which they are moved to the north end of the car house, where the truck work is carried on under electric cranes. Tracks 11, 12 and 13 are in the car wash room and are equipped with the spray system, similar to that installed by the Detroit Municipal Railway. Tracks 9 and 10 are transfer tracks intended for use only in bad weather.

In detail, car movements are as follows:

Cars due for inspection arrive on track *A* to the storage space west of the carhouse.

Cars due for washing arrive on track *B* to storage space on tracks *C, D* and *E,* and thence go direct to wash room.

Cars due for both inspection and washing arrive in the wash room over the transfer table from the inspection pit.


Supply-car Track
Office
Stores and Oil House
Blacksmith Shop
Lockers and Toilet
Heating Plant
Truck Track
Wheel and Motor change
Storage Tracks after Inspection
Storage Tracks Before Inspection
Inspection Pit
Transfer Table
Inspection Pit
Transfer
Tracks
Car wash Tracks
Trash Burner and Water heater
1
2
3
4
5
6
7
8
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16
17
18
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30
31
32
33
34
35
Storage tracks for cars to be washed
Fire Lane
A
B
C
D
E
Transportation Dept. Office
G
H
IN
OUT

This Suggested Carhouse and Storage Yard Has Facilities for Handling 205 Cars

The supply car comes in on track *A* to the storeroom, thence on over the siding to the truck track for delivery of wheels and armatures to the electric crane. In bad weather cars due for inspection come in on track *B* to the transfer table over tracks 9 and 10.

It will be seen from the foregoing that the movement of cars for inspection, washing or repairs is a wholly progressive one. There are no dead-end tracks, and no track is required to store more than seven cars.

Basing the storage space on a 50-ft. car, it will be found that the main yard easily will accommodate 154 cars, wash tracks *C, D* and *E,* twenty-one cars, tracks 3 to 8 will hold twelve cars at the west side of the carhouse, and eighteen cars at the east side, making a total of

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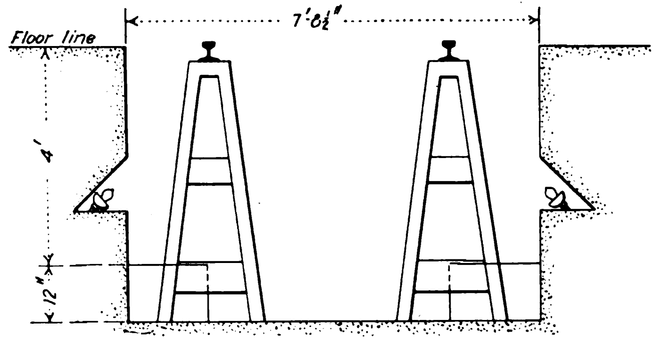
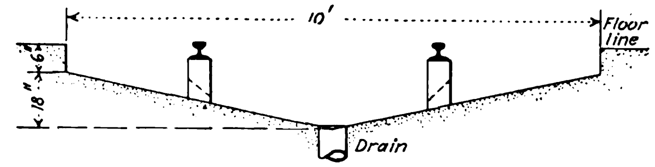
*Formerly superintendent of equipment Kansas City Railways.

205 cars that can be stored without blocking movements through the carhouse. This leaves the way open to handle trouble and emergency repairs at night without extra switching movements or interference with transportation department dispatching.

It is believed by the writer that the arrangement of the "in" tracks makes it simple and easy to dispatch cars direct to their destinations by trainmen, without additional handling by hostlers.



The Inspection Pits Are Open and Arranged for Floodlighting the Under Sides of the Cars



The Wash Tracks Provide Good Drainage for Spraying the Cars

Tracks 9 and 10, called "transfer tracks" on the drawing, were included with the distinct purpose of furnishing a means of moving cars in and out of the carhouse in cold weather without opening the doors at the ends of the inspection pits. This prevents reducing the temperature of the carhouse to a point that interferes with the comfort of the carhouse force, resulting in poor inspection.

It is not desirable, but sometimes is necessary, to make wheel and motor changes at a division carhouse. Where this practice is not followed tracks 1 and 2 could be used as straight inspection pits or eliminated.

The carhouse should be constructed with a sawtooth roof with ventilator sash, and all available wall space should be utilized for windows running down close to floor. All doors should be of the electrically-operated rolling steel type.

An accompanying illustration shows the type of pit, which would have floodlighting designed brightly to illuminate the under sides of the cars. Pits would also be equipped with compressed air for cleaning and testing. Another illustration shows a suggested type of wash track.

It is believed that while the first cost of the plan suggested may be higher than for some designs, it would show results in the reduced number of men required by both the mechanical and transportation departments.

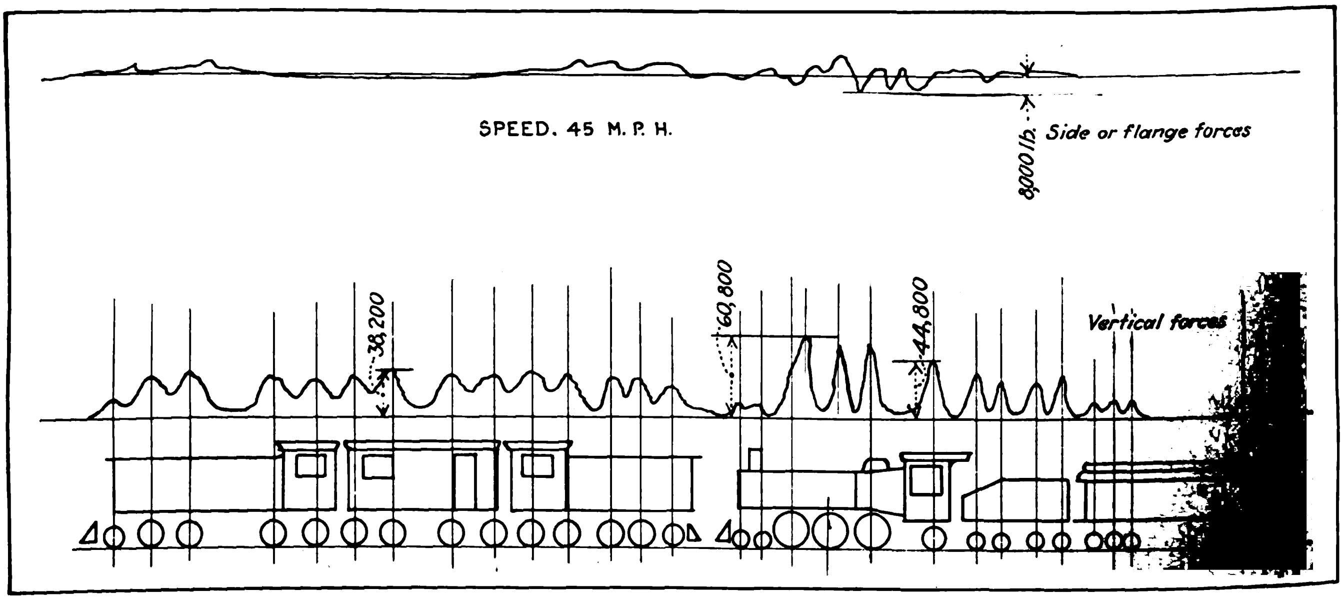
Device for Determining Stresses in Track

The Otheograph Has Been Developed to Record Actual Pressures Due to Locomotives—Graphic Record Is Made Directly by the Impact of the Wheels

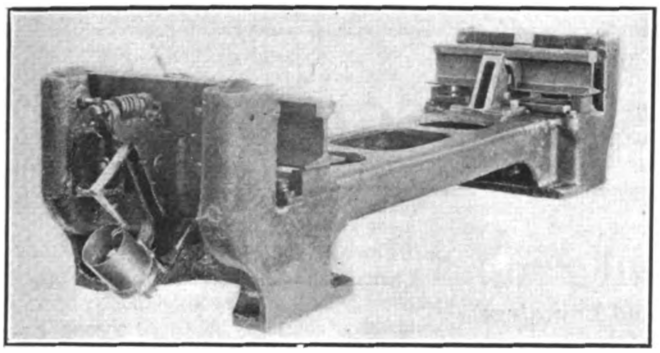
IN CONNECTION with the work of testing electric locomotives the General Electric Company has developed a new device for the determination of the pressures exerted against the rails by the passage of the wheels of a railway train or locomotive. This device, which has been named the otheograph, is placed in the track in the place of a standard tie.

The general appearance of the device is shown in an accompanying illustration. A bed of cast steel is provided, on which the rail is mounted in a manner somewhat similar to a standard tie. Instead of being supported directly, the rail rests on a knife edge at the center of a very stiff steel spring. The side of the rail likewise is supported against a spring. Any movement against these springs is transmitted through reducing motions to two pencils, one at either end of a drum, as shown. The deflection of the rail is multiplied in the ratio of 8 to 1.

Provision is made for two different springs for recording the vertical load, one having a deflection of about ⅛ in. for 25,000 lb. axle loading, the other spring, for heavier weight, having the same deflection for 50,000



The Record Shows the Individual Wheel Pressures, Both Vertical and Horizontal



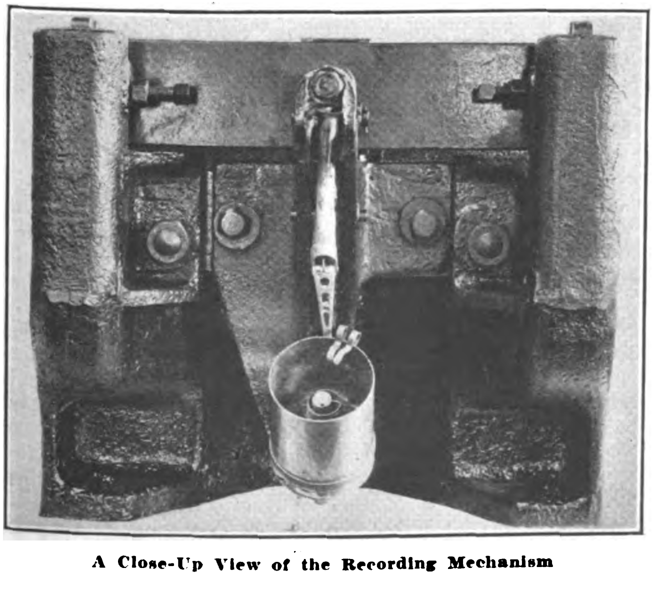
The Otheograph Is Placed in the Track Instead of a Tie

lb. axle loading. The springs are designed for a maximum deflection of ⅜ in. Springs recording the transverse thrust have deflection of about ⅛ in. for 20,000 lb.

In use a sheet of prepared paper is placed on the drum, and the pencils are adjusted to zero lines. At the instant the locomotive passes the drums are rotated by hand by means of a cord. In this way a record is made of the pressures, both in a vertical and in a horizontal direction, produced in the rails. The operating mechanism provides for moving a number of recording cylinders simultaneously so that as many records may be taken of each wheel on each side of the locomotive as the number of ties that are grouped together.

In a steam locomotive the impact of the different wheels varies widely, depending on the location with regard to the stroke. A representative record obtained with this device is shown in the diagram, with the corresponding positions of the wheels of two locomotives. This is the result of a test between one of the original Chicago, Milwaukee & St. Paul electric locomotives and a New York Central Pacific type steam passenger engine. The maximum vertical force recorded for the electric locomotive at a speed of 45 m.p.h. was 38,200 lb., being nearly uniform for all the driving wheels, while with the steam locomotive the maximum vertical force was 60,800 lb., and on the trailing wheels 44,800 lb. The maximum side or flange pressure was 8,000 lb.

It is planned to install twenty-five of these devices in a curved section of the track of the East Erie Commercial Railroad, which is used for testing locomotives built at the Erie works. With this number in use at once it will be possible to study in detail the action of the various types of locomotive construction on the track. It is expected that this will supply definite information as to the relative merits of different arrangements of running gear for operation at various speeds.



A Close-Up View of the Recording Mechanism

Bright Colors Attract Business

Circus Man Suggests to Buffalo & Lake Erie Traction Company that Cars Be Painted Emerald Green—Accident Prevention a Factor in Selecting Color

According to reports of the United States Weather Bureau, Erie, Pa., is the second cloudiest city in the country. This is probably due to the fact that the prevailing winds are westerly and sweep in, moisture laden, from the lake. For years it had been the practice of the railway company to paint its cars a dull olive green, and on a cloudy day the drab-looking street cars presented an uninviting appearance. There was no incentive to ride in them unless one were going a distance too far to walk.

The management of the Buffalo & Lake Erie Traction Company has always tried to maintain pleasant public relations, and in a half-column advertisement which appears every day in the local newspapers suggestions for the betterment of the service have been sought from the public. Not long ago a letter was received from a man who said that he had been for some time connected with the Barnum & Bailey "Greatest Show on Earth," and that one of the established policies of the circus was to attract business by the use of bright and startling colors. If the theory worked in the case of the circus, why wouldn't it work with street cars?

The idea seemed to be worth trying, and recently the first repainted car made its appearance. The lower side panels are painted a bright emerald green while the posts, letterboard and trimmings are cream colored. The roof is a light gray, and a lighter color for interior decorations is used. The change from the old dingy olive green occasioned a good deal of comment, both on the street and in the newspapers. Not a few people poked fun at the idea of emerald green street cars, but it all served to focus public attention on the railway and on the fact that something new was being tried. It will, of course, be impossible ever to attribute definitely any increase of traffic to repainting the cars, but it is very evident from remarks that are heard that people consider the change to be an improvement. Moreover, it is thought that greater visibility and fewer accidents may follow the use of brighter colors.

The cars are being painted at the East Twelfth Street shops of the company. One or two coats of Ripolin enamel are used, depending on the condition of the old paint. Cars are washed every spring and fall with a 1/100 solution of Magic cleaner, 4 oz. of the alkali being dissolved in 16 qts. of water. The average period of painting is between twenty-four and thirty months, or, on a mileage basis, about 150,000 miles. Cars are sometimes painted at shorter intervals and two coats of enamel may not be needed. Old Dutch railway enamel also is used, but no work is now done with flat colors and varnish.

A Dayton air brush is used to spray the light green paint on the lower panels. The air brush is also used on the arched roofs. Monitor roofs are painted by hand, and the cream colored work on posts, letterboard, etc., also is air-brushed on. The enameling process and the use of the spray gun have resulted in a great saving of labor cost in repainting cars.

Association News & Discussions

Badger Railway Men Meet at Oshkosh

Co-ordination Urged Between Operators, Manufacturers and Educators —Transportation, Safety and Track Problems Receive Consideration—North Shore First-Aid Team Gives Demonstration

WELCOMED by the Mayor, entertained by the chairman, and addressed by prominent personages of the electric railway industry, the second annual summer meeting of the Wisconsin Utilities Association, Electric Railway Section, was held at Oshkosh, Wis., Aug. 16 and 17, with a registered attendance of 136. Business sessions were held during the mornings of the two days, while the afternoons were devoted to inspection trips and entertainment. A well-balanced program of papers was presented which offered ample opportunity for discussion and comment.

B. W. Arnold, Oshkosh manager of the Eastern Wisconsin Electric Company and chairman of the section, acted as host, and the enthusiasm and dispatch with which the convention was held indicated the spirit of hospitality. An inspection trip to his new carhouses revealed many improvements in recognized shop practice. Following the inspection a trip was made in the new de luxe buses to the municipal park on Lake Winnebago, where the Chicago, North Shore & Milwaukee first aid team gave a demonstration of the various methods of artificial resuscitation, together with methods of bandaging and life saving.

Charles E. Scott, president of the Bureau of Safety, was the principal speaker at the banquet in the evening, delivering his speech on his very serious subject in such a manner that he held the interest of all. A quartet obtained by Mr. Arnold furnished music, while a dance followed the banquet and further strengthened everyone's belief in his ability to entertain.

At the Thursday morning session Mayor A. C. McHenry of Oshkosh welcomed the members, urging each to make himself at home. Believing, as a student of economics and government administration, that municipal ownership was the best thing for a community, Mr. McHenry admitted that now after six years in municipal affairs, he had changed his mind and realized that if the city, state or nation would carry on the work it is supposed to do, it would find the job large enough. Better results would be obtained in municipal affairs if co-operation and business methods were used, rather than to have the executive pose as a world reformer.

President Harold L. Geisse of the Wisconsin Utilities Association replied that words of welcome from a Mayor to public utility men are like balm to a troubled spirit. Continuing, Mr. Geisse explained that without its public utilities a city cannot exist. The plea of the utility enterprises is to be unmolested in their efforts to serve.

CHAIRMAN ARNOLD ADDRESSES MEETING

Following these words of welcome and response, Chairman Arnold discussed problems of the industry relating to Wisconsin conditions. "These problems," he said, "are no greater than the problems which are pressing for solution in every state in the Union, and I feel that the men charged with the responsibility of operating these utilities in Wisconsin are making just as creditable a showing as is being made everywhere.

"In general, the average individual has no conception whatever of the scope and magnitude of this branch of the utility business. He does not realize that more than $5,000,000,000 is invested in electric railway properties. This represents practically one-third of the total investment in all forms of public utilities.

"The capital investment of street railways and interurbans in Wisconsin reaches the total of nearly $100,000,000 and we operate a total of 998 miles. In 1922 we carried about 270,000,000 passengers and paid taxes in the aggregate amount of $1,073,368, or at the rate of $2,968 per day.

"Our present growth in Wisconsin lies largely in one direction. During the past year a number of our member companies installed auxiliary coach and bus service, operating as feeders and to open up new territory, while some others are maintained as a protection to the capital of the respective companies operating them. The operation of these conveyances will be carefully watched by all transportation men, and the cost of such operation will be closely analyzed. By application of a suitable system of accounting and by making proper allowances for depreciation, this system of transportation will be placed on a legitimate basis."

C. M. Larsen, chief engineer of the Wisconsin Railroad Commission, stated that the thing the commission expects of the operating men is service in a large sense. While the law has defined the term "service" specifically, its other phases should not be overlooked if the operating company is to be successful, inasmuch as employees must have satisfactory working conditions, and the private capital must have service in the form of a return on the investment.

PROBLEMS OF THE MECHANICAL DEPARTMENT

An opportunity was afforded the supply men to present their views of the master mechanic's problems when a paper prepared by H. S. Day of the Westinghouse Electric & Manufacturing Company was presented. Mr. Day said that commercial men as a group regard the master mechanic as a man who has not yet come into his own. In other words, he heads a department that should be regarded as one of more importance than it now is, particularly by the railroad's own management. Too many operators, forced by conditions to economize, have taken the mistaken position that expenditures by the master mechanic must be curtailed and have forced him to defer proper overhauling, accomplishing just the opposite result from what is needed. If there is one time more than another that a road needs a maximum number of cars in good operating condition available for revenue service, it is when the road is fighting to make receipts greater than expenses. The commercial man, according to Mr. Day, wants to see the electric railway industry on a sound footing, and thoroughly believes that master mechanics will contribute largely to placing it there, not only in better operation but in reduced cost.

Mr. Day's paper was discussed by Henry Cordell, A. P. Jenks, N. A. Stumpf, F. Fox and Earl Harra, all of whom felt that every help should be afforded to mechanical men, both by the managements and by the manufacturers' representatives.

CO-OPERATION BETWEEN RAILWAYS AND COLLEGES URGED

James T. Rood, professor of electrical engineering at the University of Wisconsin, spoke of the assistance the colleges, such as the University of Wisconsin, can be to the electric railway. That they have not been so up to the present is because both sides are at fault. The colleges have not gone out to the roads with any sort of intimate touch, while the latter have not turned as they might have to the colleges for real help on practical matters. "For a number of years the University of Wisconsin has been giving courses in electric railway work," said Professor

Rood. "Small groups of able men have been enrolled, but many have gone into manufacturing, telephone and power work. Over a course of years a considerable number of men have been sent out who from this instruction are alive to the work and the difficulties of the electric railway field and who have a sympathetic appreciation of the needs of our transportation systems. Men thus trained should become influential in helping the railroads with the public. But at Wisconsin or other engineering colleges, the courses have not been vital enough, in general, and not in close enough touch with real railway problems. There are many technical problems where the colleges could be of help, especially such as analyses of distribution and return circuits, energy consumption and schedules."

As to how work of this nature is to be done, Professor Rood said that it is not at all difficult to send out one or a group of men to a given point to secure the required data. Sometimes this can be done during term time, taking the place of regular classroom instruction. Sometimes it is best done during the shorter vacation periods, the men then bringing the results back with them for conference, analysis and report. A requirement at Wisconsin of electrical and mechanical engineering students is that experience of at least a part of one summer must be obtained in some plant, factory or system. The electric railways could be a great help in this. They can take on the students for one summer, giving opportunities to get data and letting them take it back to college where it could be used as the basis of advanced individual study or theses. Often the college is able to supply a large number of skilled observers for a big test, more men of requisite knowledge than could probably be supplied by the company itself. Again, colleges frequently have more extended regular and special equipment for such tests than could be supplied by the company, making possible better, wider and more dependable investigations.

Regarding employment of college graduates, Professor Rood points out, "so long as the railway companies permit the manufacturing and telephone companies to be the ones who select senior students for employment, just so long three things will happen. First, these corporations will get the pick of the students, so that should the railways desire to take on some of our men the chances are that they will get only the less desirable ones. Second, the course in transportation and power plant work is made less effective because less desirable in the eyes of the student, since he judges largely from the number and desirability of the position offered him. Third, the possible extent and the effectiveness of the help which the university could give the railways is greatly reduced."

Mr. Arnold suggested that a railway fellowship at the university, similar to the existing gas and electric fellowship, be established by the railway section at the next business meeting. Such a fellowship, Mr. Arnold pointed out, would aid the railway industry of the state to obtain desirable men for the various properties.

THE HUMAN SIDE OF BUSINESS

Charles B. Scott, president of the Bureau of Safety, presented an address on the human side of business under the somewhat intangible title, "Safety." Along these lines Mr. Scott said: "While the subject upon which I am to speak is quite unlike the mechanical or operating problems, it is a subject of absorbing interest devoted to the human side of things. My object is to bring before you your responsibility to your company and to the public from the viewpoint of accident prevention. I am talking as an individual about the duty you owe your company, and as a man who constitutes part of a nation. I am afraid that the industry fails to appreciate the importance of the human side of the business.

"Safety is not a question of physical property. It is the result of giving attention to the man-power in the organization. Figures from representative organizations show that 75 per cent of all accidents were due to causes other than the physical properties. If, therefore, you are giving no attention to the human side of the organization, you are doing at the most 25 per cent of your share in accident prevention, However, I feel that the time is coming when the industry as a whole will give more attention to the human side of things.

"There are three requisites for safety in any organization. First is the heartfelt and sincere interest and support by the chief executive. Second is the proper selection and instruction of the men. Third is the continuity of effort. It is continued accident prevention which tends to humanize the entire industry. We should not be too critical of some of the means employed to bring about safety. Often it is necessary to go far out of the beaten track of procedure to bring home a lesson of safety to the man. Soon after I started in this safety work, I had the task of 'selling the idea' to an organization employing 6,000 men, in which thirty-three were killed within five years. The management felt that if an average of seven per year were killed they were operating with a fair degree of safety. If more than seven were killed, that was considered a bad year, while if five or six were killed it was considered an exceptionally good year. After the installation of a safety campaign, within the next five years only eleven were killed. During the past year, I understand, only one man lost his life in the service."

THE A.E.R.A. AND ITS RELATION TO WISCONSIN RAILWAYS

At the Friday morning session, James W. Welsh, executive secretary of the American Electric Railway Association, gave a very interesting talk and exhibited many pamphlets and statistical records which were the results of the work of the association. In Mr. Welsh's talk, which is abstracted elsewhere in this issue, he pointed out that the association is primarily a clearing house for statistical data and material and is at the service of any property to help solve whatever problem confronts it.

MOTOR VEHICLE DISCUSSED

Motor vehicle problems were the subject of two papers and much discussion, the operators' side of the question being presented in a paper by Henry Cordell, master mechanic Chicago, North Shore & Milwaukee Railroad, who said in part: "Our company, aside from the excellent service provided by interurban and city cars, also operates buses between Lake Geneva and Kenosha, Kenosha and Waukegan, Highland Park and Wilmette, as well as in the city of Waukegan to give transportation to a section not covered by street car service. Buses are also chartered for special parties and tours to lake resorts and other points of interest. The average daily bus mileage operated is 2,900. The regular service is given by twenty-two buses, consisting of nineteen White Model 50, city-type bodies, and three Fageol city-type bodies. For the chartered and tour service five Fageol intercity type safety coaches are used.

"We also maintain a fleet consisting of seven White 5-ton tractors, two United 2½-ton tractors, eighteen Highway 10-ton semi-trailers and one Buick speedwagon. The total mileage operated with this equipment is about 28,500 miles per month.

"The acquisition of bus lines by the electric railway made a new maintenance problem. An organization which had been educated along the line of maintaining electric car equipment can hardly be expected to produce automobile experts. However, there is a decided advantage to use old and true men on this work, even if you have to educate them all over. One thing they do know is what is required after close and careful inspection—lubrication and cleanliness.

"After all, the difference between an interurban or a street car and a bus is not so great as might appear at first. The fundamental parts are the same. The body, with the exception of its shape, is the same, wheels are still in evidence, and other mechanical parts function the same although they may be differently constructed. The electrical equipment is much along the same line as the electrical apparatus and wiring of street cars, and is readily understood by the men. The motor, control, and means of power transmission differ the most, and it is here that we must spend most of the time instructing not only our men but ourselves.

"The automobile or bus is still in the stage of development and only recently have the manufacturers been met with the concerted and constructive criticism which the electric roads and operators alone can give. This will lead to the building of equipment which will compare favorably with electric cars and give reliable service. We are looking forward to the same spirit of co-operation from the automobile manufacturers that was brought about by the electric railways and customers of the car builders getting together with the manufacturers, who were willing to co-operate. Still, looking into the future I can see where bus and automobile riders, fed up on rubber and gas and unavoidable delays due to climatic conditions, particularly in this part of the country, will return to the good old electric cars, particularly when service such as is rendered by the North Shore line is to be had."

Mr. Cordell then told in detail of methods used for inspecting and repairing the automotive equipment used on the North Shore line.

The manufacturers' side was presented by Howard Smith, manager General Tire Company, Akron, Ohio. In his paper Mr. Smith stated that the tire industry looked upon the bus and coach business very enthusiastically. He then gave some statistics relative to the history of the tire industry.

In the discussion of these papers H. L. Debbink, in charge of the motor coach division of the Milwaukee Electric Railway & Light Company, gave some very interesting facts relative to the operation of the company's coaches. Earl Harre of the Eastern Wisconsin Electric Company presented some figures on oil costs. W. E. Thorn urged the railway men operating coaches to make their own inspections and do their own maintenance work, inasmuch as railway inspectors and maintainers were more thorough in their work than private garage mechanics.

GETTING THE PUBLIC TO RIDE

C. H. Allen of the Wisconsin Public Service Corporation, Green Bay, presented a paper on some factors in service, which is printed elsewhere in this issue. In the discussion, W. H. Burke, division superintendent Chicago, North Shore & Milwaukee Railroad, stated that he agreed with the conclusion of Mr. Allen regarding the value of advertising street car service. "The main problem in the transportation business," said Mr. Burke, "is to fill the cars, since, as Mr. Allen states, it costs but very little, if any more, to operate a car with a maximum load than to haul it empty. A merchant's show windows should be one of his chief trade assets. I sometimes wonder how many railroad men think of this point.

"One important way for a street railway to sell its transportation is in the seating arrangements. The average rider does not like a longitudinal seated car. Even if the cross-bench seat does detract from the standing capacity, it is the seat that the rider wants in nine cases out of ten. Therefore, why not aim to give it to him? Putting the thing the other way around, why fret his soul with awkward or uncomfortable seats, with turnstiles and other similar devices, and then expect his undying affection and support? After all, your patron is but human. He likes his motor car because it seats him the way he likes to be seated. How many motor cars do you think Henry Ford would be making each twenty-four hours if he had them rigged with longitudinal seats, or if a man had to climb through a turnstile to get into one of them?

"A first-class salesman does not depend entirely upon correspondence to sell his product, but knows that it is very desirable for him to come into personal contact with his customer. The rolling stock is one of the essential points of contact between the railway and the traveling public. I believe that a well-painted car, kept in good condition to eliminate noise, is so good an investment that it increases the riding sufficiently to pay for the additional expense necessary to keep it in good condition.

"From a bankrupt and almost helpless interurban trolley system the company I am associated with," said Mr. Burke, "has been brought back, not only to life, but to something approaching success, one of the best roads in this country. And how was that done? It is too long a story to be told in detail. However, it was not done by the installation of cars that were dirty, uncomfortably seated, or equipped with cumbersome passenger regulatory devices. The equipment of the trains, terminal stations, cars, and all the rest of it was planned with a view to satisfy the necessities, comforts and even the whimsical desires of the passengers.

"Serious reductions in the income of interurban railways have resulted from increased use by the riding public of passenger motor vehicles. It is generally conceded that there is no permanent way to overcome this condition. If interurban railways expect to continue to live, some means must be found to augment their depleted income to such an extent that will enable them again to build up their properties to a high standard of maintenance.

FREIGHT HAULAGE RECOMMENDED

"The most logical and surest means of accomplishing this is through the development of freight business. Much tonnage can be hauled during the idle periods and off-peak hours, thus making unnecessary any further investment for power facilities, and at the same time utilizing this idle equipment in revenue producing service. The cost of providing adequate terminals, motive power and rolling stock, and also a competent traffic organization, which are other essential requirements for conducting a successful freight business, is comparatively small. More or less freight is being handled by a number of electric lines, but in the past we have given little attention or encouragement to this phase of the operation. Such service as is being given is the result of insistent demand on the part of the shippers, and as a general rule no consistent efforts have been made to conduct the business along progressive lines, notwithstanding this branch of service is a proved source of net income.

"Transportation authorities have presented figures showing that short hauls, and especially less-than-carload traffic, for distances up to 75 or 100 miles cannot be handled by steam lines except at a loss. This is on account of the necessarily large overhead expense involved in providing extensive terminals, trackage, etc., suitable for long-haul traffic. The electric line can handle such tonnage more economically and at a profit, by reason of its more flexible and lighter equipment, smaller terminals and much lower overhead."

Discussion of track construction was opened with a paper by Clyde L. Hedges, which will appear later in this paper. F. E. Hibbard, construction engineer Milwaukee Electric Railway & Light Company, gave some very interesting facts relative to the track construction in the city of Milwaukee, bringing out the fact that thermit welds, tie rods, concrete-reinforced pavement and labor-saving devices were the outstanding features of their construction. Mr. Hibbard and Mr. Kraemer of the Chicago, North Shore & Milwaukee Railroad discussed to a considerable extent the application of Hedley mulsified asphaltic oil in the construction of grade crossings and railroad intersections. It was the opinion of both that the oil had proved very satisfactory in every capacity that they had used it and they also felt that the number of uses for the oil was unlimited.

Some Factors in Service*

By C. H. Allen
Wisconsin Public Service Corporation,
Green Bay, Wis.

IT COSTS little, if any more, to haul a car loaded to capacity than to haul it empty. Our objective therefore must be to increase the returns; and to attain our objective, we must keep before our operators and the public constantly the keynote of railway transportation: Service.

We must serve all the public, in order to increase the number of car riders. Service means, first of all, clean and neat cars, 100 per cent on time, and courtesy from operators. It is worse to have cars one minute ahead of schedule time than one minute late. In towns the size of Green Bay, where cars run on a twelve or fifteen-minute headway, if a patron misses a car the chances are he will walk, or start walking and be picked up by a friend in an auto, and another fare is lost.

When people realize that at a certain minute a car passes a certain corner, they will ride. On our best line cars are invariably on time. We have several business men living adjacent to that line who own automobiles, but who ride the cars to work. If our cars were not on time these men would use their autos, and carry others with them who would otherwise ride the cars.

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*Abstract of a paper presented before the Electric Railway Section of the Wisconsin Utilities Association, Oshkosh, Wis., Aug. 17, 1923.

Invite complaints and show the complainant the utmost courtesy. Let him know that you are trying to give him the best service possible, and that you welcome the opportunity to correct defects. Make the complainant a booster instead of a knocker. When the service is off for some unavoidable reason, see that the press carries a story explaining why.

Courteous operators are of vital importance. There is no place in car service for a grouch. Passengers frequently comment on the pleasant manner in which an operator directs some old lady to the hospital to which she was going, or the attention shown ladies with children. On the other hand, the operator who is discourteous not only hurts the service in the eyes of the particular passenger to whom he shows the lack of courtesy, but makes an enemy of every regular rider on his car.

The next time he has an accident with some of those riders as witnesses, they will have very little good to say of his operation. Our claim department reports that when an accident happens, it can tell quite accurately what kind of statements they are going to get from witnesses, by the reputation of the operator for courtesy or lack of it. If he is a man they like, everything he did at the time of the accident looks good to them, and they place all the blame on the other fellow; but if they dislike the motorman, they can see very little good, even if he did all in his power to avoid the accident. A courteous motorman will have on his list of witnesses passengers who will not only support him in every statement he makes, but will so testify in court. The effect of his courtesy even may extend to the jury that tries the case.

Advertising is a good salesman for special forms of transportation. In our experience neat car cards in conspicuous places bring results, especially if ticket books are used on which the public rides for a reduced rate. Strangers call at our ticket window every day, saying that they have read the car cards and want to buy the books to obtain the reduction.

We believe that our bonus system for operators brings about better service. When Mr. Warwick explained our bonus to this meeting last year, our bonus system had been in effect a time too short to be taken as a true test. This year, however, we are able to give you some statistics on it which tell a more reliable story.

In 1922, the last nine months of which we operated under our bonus system, we had 160 accidents. We paid out for the year 1922 in settlement of all claims $1,040. Of this sum we paid out only $287 during the nine months in which the bonus system was effective, or about 0.1 per cent of our gross income. During these same nine months we collected as damages to street cars caused by collision with motor trucks $228. During these nine months therefore we paid only $69 more than we collected.

During the first seven months of 1923 we have had 144 accidents. We have paid out for claims during this period $66, or approximately 0.03 per cent of our gross income. During the same seven months we have collected $170 as damages to street cars from truck owners. During the sixteen months of our bonus system we have fought four lawsuits and the jury has given us a verdict in each case. We have no accident or damage suits pending at the present time.

The Place of the Motor Bus*

All Local Transportation Should Be Subject to Same Restrictions—Increased Facilities Should Give Greater Riding Habit—Evidences of Improvements in Electric Railway Industry Many

By J. W. Welsh
Executive Secretary American Electric Railway Association

THE motor bus is proving itself today to be a very useful ally to the electric railway industry. It has been taken up by many companies to develop extensions into districts not previously served and in some cases to replace non-profitable routes when expensive track and paving replacements became necessary. Owing to its low capital investment it has saved electric railway companies from making the large expenditures ultimately required for a permanent rail system. The latter is deferred until traffic has developed to the point where the lower operating costs of the rail installation are sufficient to justify its larger capital requirement.

The question of fitting the bus to transportation service is, however, a detail to be worked out in accordance with local requirements. It is vastly more important that communities should recognize the necessity of co-ordinating their transportation service as a whole, from the standpoint of public convenience, safety, comfort and economy. It is disastrous to the public as well as to the private interests concerned to encourage or permit the competition of unregulated buses with the closely circumscribed service and fares of the electric railway. To be fair, both must come under the same authority and be subject to the same restrictions. The alternative is to remove all restraints from both and let the electric railway run the service it pleases at any fare it sees fit to ask.

BUSES ARE REGULATED IN FORTY-TWO STATES

All the states in the Union except six have taken official action with respect to the motor bus. Public utility commissions have some sort of jurisdiction in thirty-two states, and in seventeen of these the commissions have issued general orders governing their operation. Thirty-six states have imposed a gasoline tax. The "Certificate of Convenience and Necessity," under which competition with electric railways or other buses is either completely eliminated or restricted, is effective in twenty states. Unfortunately, however, in some of these states this requirement is of recent origin and does not apply to buses previously in service. Issuance of indemnity bonds is required in twenty-three states and reporting of accidents in fifteen. The commission has authority over rates of fare in nineteen states, and regulations regarding routes are prescribed by the commission in fourteen and schedules in sixteen. It is the larger and more important states that have taken the lead in these matters, and consequently it may be said that the country as a whole has progressed well in according the bus a legitimate place in transportation.

When it comes to the question of fare to be charged, it is even more important that the community as a whole should be considered. Every electric railway man knows that the cost per passenger carried varies through the widest possible limits on the various routes of any system of any size. He would gladly agree to carry passengers for a 5-cent fare if he could choose certain routes only on which this would apply. Other routes of the same system, less favored by density of traffic, length of haul and other factors, would require fares ranging from 10 cents up.

If the greatest good to the greatest number is to be the principle, then the fare should be averaged within the limits of the areas where a common interest is recognized. Thus it is that the bus when allowed to compete unrestrictedly with the established rail service has been able to choose a favorable route and seemingly operate successfully at a low fare. In the city of New York today the operators of buses on the Grand Concourse are finding they are losing money on the 5-cent fare prescribed by the city administration. Unregulated competition may be counted as only a passing phase in the application of the motor vehicle.

EFFECT OF MOTOR VEHICLE ON RIDING HABIT

A more vital question, I believe, is the ultimate effect of the motor vehicle, including all its forms, on the riding habit. If the riding habit is increasing, then the transportation industry is stable and may look to the future with confidence. What has been the effect of the 11,000,000 pleasure automobiles on the number of riders on public conveyances such as the electric railway and the legitimately operated motor bus? To determine this we have prepared an index number represented by the daily car riders average for the month and going back for several years. There are, of course, numerous factors which affect this figure, such as general business conditions, employment, etc., which are reflected in this study. The index is based on the average of 1920, as this represented the best year since the war. It is noted that the trend is downward to the winter of 1921-22, since when it has been climbing upward, and now has gone above the 1920 average. As this includes no bus passengers, and represents eighty typical railways picked at random over the country, it is a most significant and encouraging sign of the inherent stability of the electric railway. This represents a total of more than 15,000,000,000 passengers for the country and an annual gross revenue of $1,100,000,000, of which $50,000,000 is from the carrying of freight. This gives the electric railway seventh place among the industries in the value of its output. There are 45,000 miles of railway track today in active service and the total capital investment is $5,600,000,000. These are large figures and are significant of the magnitude of the industry.

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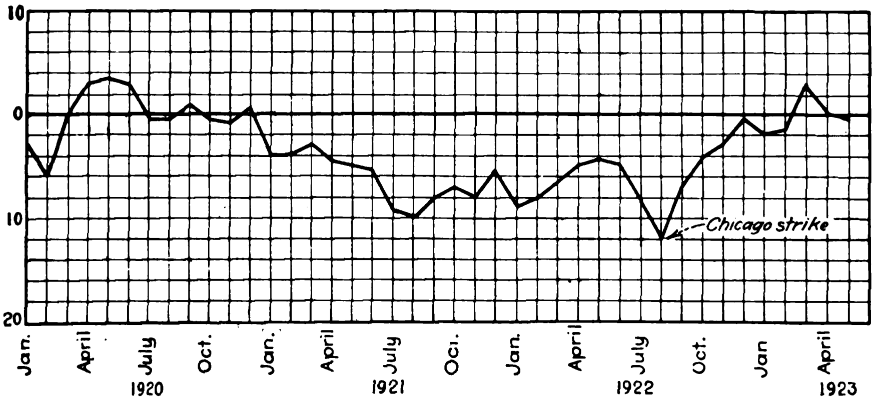
*Abstract of address before the Wisconsin Public Utilities Association, Electric Railway Section, Oshkosh, Wis., Aug. 17, 1923.



Riding Habit Index, Based on Eighty Typical Electric Railways
Zero taken as daily average for 1920

As a tax collector, the electric railway has been quite successful. It contributes today $92,000,000 annually in the form of direct taxes, plus the other imposts levied upon it, such as paving, street cleaning, snow removal, etc. These charges amount to 10 per cent of the fares collected on the average, while in individual cases they amount to as much as 15 per cent. In other words, from ½ cent to 1 cent out of every street car fare is collected as taxes. This is the culmination of a burden which has been increasing at an alarming rate in recent years. For the year 1922 the direct taxes alone amounted to $70,000,000, and with the other imposts to $92,000,000, while the net income was but $84,000,000. Thus the electric railways paid more money into the public treasury last year than they paid to their stockholders and to the various reserve funds combined. Since 1890 operating revenues increased 1,000 per cent, while taxes increased over 2,000 per cent, and net income increased a little over 500 per cent. A committee of the association will report on this subject at the convention and it is hoped more effective means than those already tried may be suggested to secure much-needed relief.

WAGES UP; FARES DOWN

Comparing the first half of 1923 with 1922, the association's returns from companies throughout the country show a most favorable trend. There has been a 6.6 per cent increase in passengers carried, a 3.5 per cent increase in gross revenues, a 6 per cent increase in net revenue and a 3.7 per cent increase in service measured by car-miles operated. This has been accomplished in spite of a 2.5 per cent increase in wages paid and a 3.6 per cent reduction in average fare per passenger.

In other words, the industry as a whole has increased wages and decreased fares. It has increased the service rendered and carried more passengers. At the same time it has increased its net revenues, or the company's own share of the receipts. If this doesn't indicate a promising condition and a wide-awake and efficiently conducted business, I will leave it to the professional investigators.

Evidences of good management and an active and searching study for improvement in the industry are many. Labor-saving machinery in track construction has permitted track to be relaid under traffic conditions at a minimum cost. The welded rail joint is saving millions while it offers a smooth-riding surface, which is the despair of the jitney. The association has raised a fund of $23,000 to study this further. The automatic substation is a saver in power costs. Light-weight one-man cars have been important in aiding service in certain places, while still larger cars with trailer operation are providing a rapid and comfortable ride in others. Better shop practice and maintenance methods have lowered up-keep costs. These are a few of the improvements. Many others are under way. The use of higher quality materials and the release of inventive and mechanical genius will undoubtedly add greatly to the further advancement of the industry.

SUMMARY

The motor vehicle is a new tool in the hands of the railways, offering a cheap method of expansion as a forerunner to the installation of the permanent rail system. It has taught the riding habit to those who used to walk and increased the opportunities for transportation service.

Nothing has developed, or is likely to, which will destroy the necessity for public transportation.

Regulations by public authorities are overcoming the inequities of the past and unjust competition is being eliminated.

Taxation and the additional burden due to franchise obligations are receiving close study and the future should see a material alleviation in this direction.

Wonderful opportunities for inventive genius exist in improving the mechanical forms and economies of transportation facilities, and with these should come a corresponding return to the industry.

Inquiry Suggested Into Public Ownership Abroad

W. P. STRANDBORG, president of the Public Utility Advertising Association, is outlining to members of the association a plan for conducting a broadside investigation of public ownership in Europe. It has been the thought of Mr. Strandborg ever since it was decided to hold the World's Advertising Convention in London next year that it would be a splendid opportunity for the advertising association to form a strong, representative and well-equipped delegation to attend the London convention and then sit as a commission, preferably in London, and conduct formal hearings into every phase of government ownership in Europe. It is his idea to invite prominent public utility men from all the leading countries in Europe to attend these hearings and be prepared to present information that might have material bearing on the railroads, tramways, light and power, gas, telephone, water—in fact, every phase of the utility industry.

As to the personnel of the commission, it has been suggested that it be limited to about twenty-five men, every one equipped to handle a definite phase of the subject—men who have had experience in public relations work with large management corporations or the large industrial concerns whose business dovetails into the public utilities industry; also, representatives of the leading state committees on public utility information and the National Utilities Association.

In order to assist in the efficient dispatch of the work by this commission, Mr. Strandborg would ask the national utilities to designate one or two legal representatives, one or two engineers and one or two operating men to act as advisers for the commission. It would also be essential to establish as early as possible a contact committee, preferably in London, to get in touch with all phases of public ownership of utilities in Europe, to invite the proper utilities men to attend the commission hearings and to see that all the documentary, engineering and operating data necessary are available for the use of the commission.

Overhead Construction Specifications Approved by A.E.S.C.

THE specifications prepared by the American Electric Railway Association for 600-volt direct-current overhead trolley construction (Ds 2c) have been approved by the American Engineering Standards Committee as tentative American standard, and the American Electric Railway Association has been designated sponsor for the revision and future development of these specifications.

In the preparation of the specifications co-operation was had from a number of the larger manufacturers of overhead line material, as well as from engineers and contractors. They embody much of the best practice in electric light, power and communication, as well as electric railway service, and it is understood that they have been followed to a large extent by the majority of electric railways as standard construction practice.

In recommending the approval of these specifications, the special committee of the A.E.S.C., headed by E. A. Frink, called attention to the revision of the National Electrical Safety Code now under way. The revision of this code and of the specifications for trolley construction will be carried out in such a way as to assure their complete harmony at all points where they contain related provisions.

National Safety Council Convention

THE twelfth annual convention of the National Safety Council will be held in Buffalo Oct. 1-5. All meetings will be in the new Statler Hotel. Marcus A. Dow, New York, president of the council, will preside.

American Association News

B. I. Budd Is Nominated for President

THE nominating committee of the American Electric Railway Association has made its report in favor of the following men for election at the coming annual meeting, Oct. 8 to 12, in Atlantic City:

For president, Britton I. Budd, president the Metropolitan West Side Elevated Railway and Chicago, North Shore & Milwaukee Railroad, Chicago, Ill.

For first vice-president, J. N. Shannahan, president Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va.

For second vice-president, F. R. Coates, president Toledo, Ottawa Beach & Northern Railway, Toledo, Ohio.

For third vice-president, W. H. Sawyer, president East St. Louis & Suburban Railway, East St. Louis, Ill.

For fourth vice-president, R. P. Stevens, president the Pennsylvania-Ohio Electric Company, Youngstown, Ohio.

For treasurer, Barron G. Collier, president Barron G. Collier, Inc., New York.

Four members of the executive committee are to be elected this year, two representing railway members and two representing manufacturer members, their terms expiring in 1926. The railway members nominated are J. H. Hanna, vice-president the Capital Traction Company, Washington, D. C., and H. B. Flowers, president New Orleans Public Service, Inc. The manufacturer members are E. F. Wickwire, secretary the Ohio Brass Company, Mansfield, Ohio, and Cornell Hawley, president Consolidated Car Heating Company, Albany, N. Y.

Entertainment at the Convention

THE entertainment committee met in New York on Aug. 22 to make final arrangements for the Atlantic City convention, Oct. 8 to 12. The members in attendance were: J. C. McQuiston, chairman; C. C. Beck, Harold A. Hegeman, Jerry Stanton for E. F. Wickwire, L. W. Shugg, E. P. Waller, George R. Lyman, J. V. Sullivan, J. P. Barnes, L. H. Palmer, Edwin C. Faber and Harry L. Brown. The program of entertainment that will be provided will be about as follows:

One of the Paul Whiteman orchestras will supply music each morning from 11:30 to 12:30; each afternoon except Thursday from 4 to 5, and for the evening affairs.

The Submarine Grill at the Traymore Hotel has been designated as the official midnight rendezvous each night, and there will be dancing and music until 2 a.m.

A golf tournament has been planned for Sunday, Oct. 7, at the Northwestern golf course. Prizes will be offered.

Monday evening the opening dance in honor of the president and officers of the association will be held on the Pier.

Tuesday evening will be given over to a carnival or feature night on the Pier, with dancing.

Wednesday evening there will be a Grand Ball at the Ambassador Hotel with specialty numbers interspersed between dances.

Thursday evening arrangements have been made for a theater party and also for a water show at the Ambassador Hotel.

For the ladies, a very inviting card party has been arranged at Haddon Hall for Tuesday afternoon. Another card party is to be given on Wednesday afternoon at the Traymore Hotel. And on Thursday afternoon the ladies will be entertained at the Ritz-Carlton Hotel by a much talked of mind reader.

Committee on Coffin Prize Meets in New York

THE committee which will award the Charles A. Coffin prize in the electric railway field met at the association headquarters in New York on Aug. 23 to give consideration to the applications from eighteen electric railway companies.

After going over the reports briefly, it was decided to engage two railway consultants to make the detail analysis of the data submitted and to select the three or four best petitions from which the committee will then choose. John A. Beeler and Albert S. Richey were employed to do this work and to report by Sept. 20. The committee will then meet again on Sept. 21. The committee members sitting were: C. D. Emmons, chairman; Britton I. Budd and James H. McGraw. W. W. Trench, secretary of the Coffin Foundation; J. G. Barry, vice-president General Electric Company, and Executive Secretary Welsh were also present.

Meetings and Subjects

THE committee on meetings, and subjects met in New York on Aug. 22 and made final arrangement for the program for the October convention. This program will be published along with the programs of the affiliated associations in next week s JOURNAL. The plan previously announced to hold one evening session devoted to public relations with some nationally prominent speaker was abandoned. The subject of "customer ownership" was also dropped from the program on account of pressure of time.

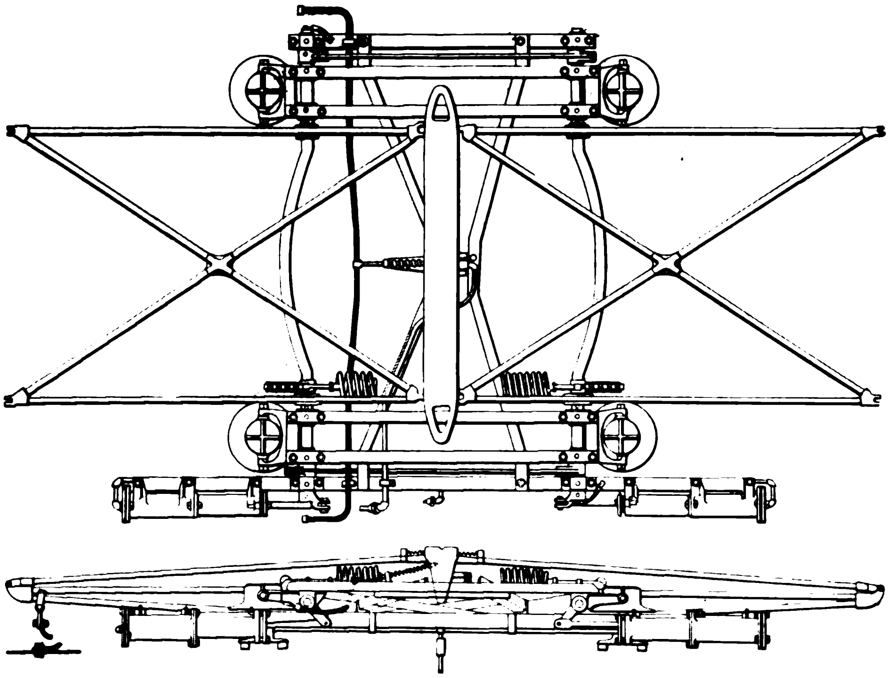
The committee also discussed briefly the subjects which it would recommend for consideration of the association committees next year, and decided to send a letter to all the committee members asking that they make suggestions along this line for consideration at the next meeting of the committee to be held in Atlantic City on Sunday, Oct. 7, just prior to the convention.

Those present at the meeting were: Messrs. J. N. Shannahan, chairman; H. V. Bozell, L. H. Palmer, L. C. Datz and Executive Secretary J. W. Welsh.

Maintenance of Equipment

New Pantograph Unlocking Device Saves Time

BY MEANS of a slight change in the pantograph unlocking apparatus, the New York, Westchester & Boston Railway has greatly facilitated the work of the motor-switchmen who prepare the cars for service.



The Heavy Line Shows a Piece of Shaped Conduit Fastened to the Pantograph Latch. It Saves Time in Preparing Cars for Service

Normally the pantograph is locked and unlocked pneumatically. Previous to the installation of the modification described below, when it was desired to raise the pantograph on a car standing without power or compressed air, it was necessary in order to create the air pressure for unlocking the latch to use a small hand pump located under the car body.

This method was unsatisfactory for several reasons. When the car was alongside a high platform station, the hand pump was difficult to get at. The pressure created by this pump was not always high enough properly to unlock the pantograph. Some men forgot to restore the valves to their normal position after using the hand pump, thereby preventing the proper locking and unlocking of the pantograph by means of the magnet valve in the motorman's cab.

The new unlocking device consists of a piece of 1-in. iron conduit bowed in the middle as shown in the accompanying drawing. This pipe is mounted on two brackets, one at each side of the pantograph support frame. To the center of the shaped conduit is attached a rod, the opposite end of which is fastened to the unlocking latch of the pantograph cylinder. A spring is fastened to this rod to insure the return of the latch to the closed position.

Instead of having to get down underneath the car and use the hand pump, all that it is now necessary for a motor-switchman to do in preparing a car for service is to reach up with an insulated hook and pull down on the bent portion of the conduit pipe. This movement is communicated to the rod at the center, and the latter releases the pantograph latch. When the latch is released the spring raises the pantograph to the wire.

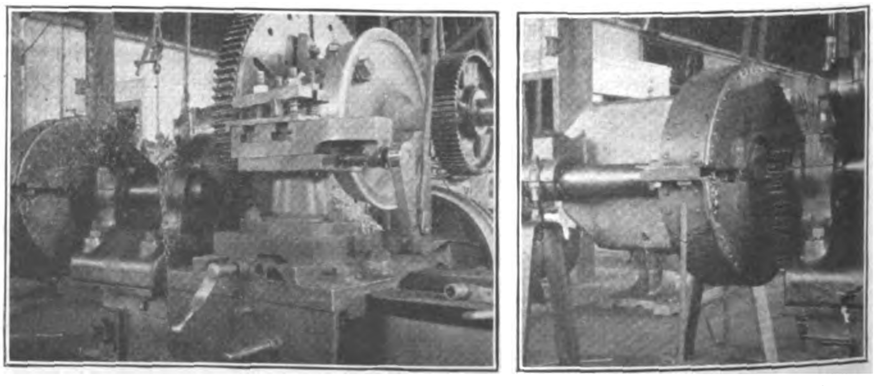
This device has already been installed on all of the No. 1 pantographs of the cars of the New York, Westchester & Boston Railway. It is being installed also as rapidly as possible on the No. 2 pantographs of these cars. When the installation is complete it is the intention of the company to remove the hand pump. A similar device is being used extensively on the New York, New Haven & Hartford electric cars.

Automatic Feed for Lathe Toolpost Carriage

THE Kentucky Traction & Terminal Company does not have a regular wheel lathe in its shop at Lexington, but has rigged up an old two-spindle lathe for wheel turning, as shown in the accompanying illustrations.

The crank on the feed screw of the toolpost carriage of the lathe was removed and a ratchet arm was put in its place. In order to give the ratchet arm a reciprocating motion, it was connected through connecting rods and bellcranks on an overhead shaft to a faceplate crank on the end of the upper lathe spindle just outside the headstock.

This permits a cut to be taken on the wheel tread at an angle to give any desired coning. A steel wheel



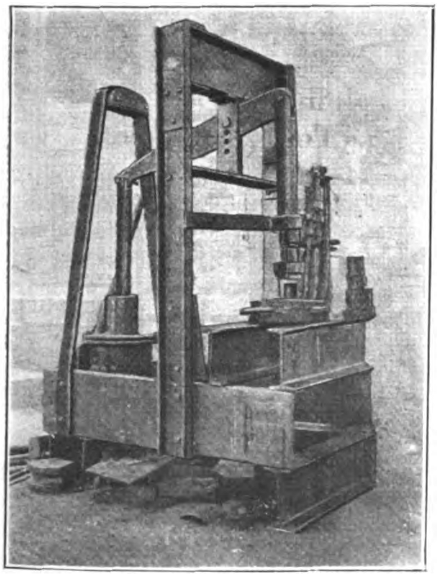
At Left, a Ratchet Lever on the Toolpost-Carriage Feed Screw Does the Trick. At Right, an Old Railway Motor Drives the Wheel Lathe Through Gearing of one of the company's light-weight interurban cars is shown in place in the lathe.

As the pictures show the rather unique motor drive used for this lathe, a word regarding it may be in order. Power is supplied by an old railway motor which is mounted on steel floor stands and drives the lathe through its back gear.

A Powerful Bearing and Broaching Press

AMONG the many uses for compressed air in and around the electric railway shop, the performing of pushing and pulling operations is one of the most obviously advantageous. A press which is used for pushing motor bearings into and out of housings, which the men in the Virginia Railway & Power Company's shop at Norfolk have built, illustrates this.

This press comprises a 10-in. airbrake cylinder with a lever for multiplying by two or more the push supplied by the cylinder. The foundation of the press is made up of I-beams and channels built up as shown in the picture. Three 2-ft. pieces of 8-in. steel I-section rest on the floor. These support, on their ends, two 3-ft. pieces of 10-in. channel-section, set with the flat surface outward. Bolted to the channels are two 3-in. upright channels, placed a few inches off the center of the channels and rising to a height of about 4 ft. 6 in. from the bottom of the channels. A piece of 8-in. I-section joins the uprights at the top, being supported on brackets inside, with reinforcing plates outside. Bolted to the under side of this I-beam is a pair of flat plates forming the bearing for the fulcrum pin, projecting downward about 10 in. and perforated with a row of holes to permit the lever to be raised and lowered. These plates are 3 in. wide and they are stiffened at the bottom by being bolted to a similar cross-plate spanning the distance from upright to upright. Supported from this bearing is the lever, shown in the illustration, with a ratio of 2 to 1.



An Air-Operated Bearing Press that Provides Freedom of Movement for the Operator

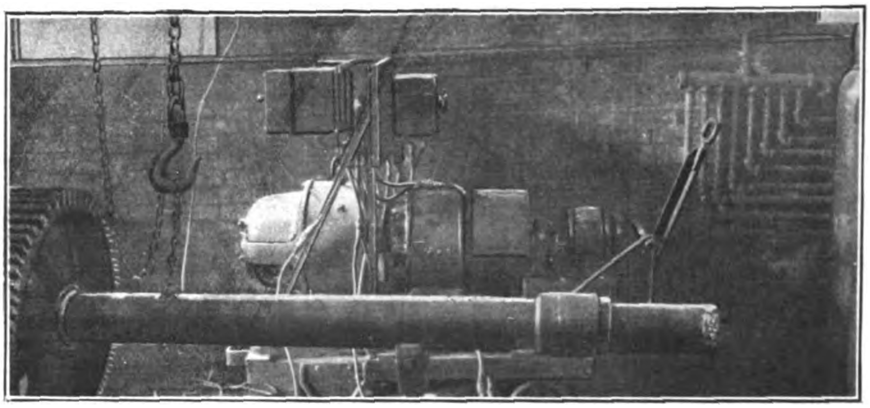
At the back of the press is a 10-in. airbrake cylinder, with its elongated plunger rod attached to the long end of the lever. A wood block mounted at a suitable height, on a 2-in. flat-iron support, limits the travel of the piston. A 2½-in. round rod hangs from the other end of the lever, being maintained vertical by a guide, made of 1½x⅜-in. flat steel, bolted to the uprights at a suitable height.

To provide a table for the motor housing to rest upon while the bearing is being pushed in or out, two 8-in. I-section pieces 2 ft. long are placed from one foundation channel to the other, being spaced sufficiently to allow a bearing to drop down between them.

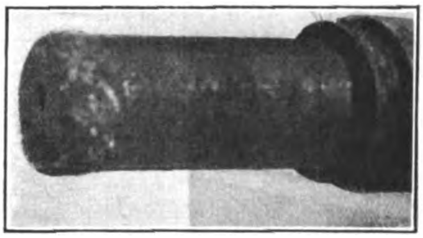
With 75 lb. per square inch pressure in the air line, the press will produce a force of about 5 tons, which is ample for the present purpose, as well as for broaching bearings, to which it is well adapted.

Pinions Boiled in Hartford

AT THE Hartford shops of the Connecticut Company a gas fed pot is used for boiling pinions before they are put on the armature shafts. The pot is close to the assembling track, and the heat of the pinions, when they are removed from the boiling pot, enables them to slip easily over the armature shaft.



New Portable Welding Set



This Is the Only Part of a Car-Axle Journal that Can Be Welded with Impunity

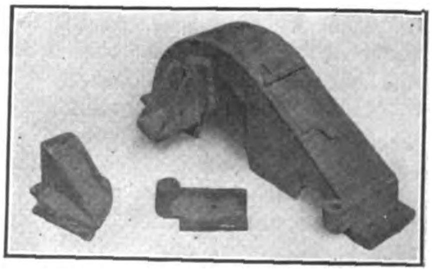
Restoring the Check-Plate Groove on Axle Journals

WHILE it is generally considered unwise to do any welding for the purpose of building up worn axle journals or the abutting shoulders, some railways find it profitable and perfectly safe to fill in a worn check-plate groove on old-type axles, to permit recutting, with the aid of the electric welder.

An axle end built up in this way in the welding department of the Indianapolis Street Railway is illustrated. The Westinghouse welding set used is shown in the upper halftone.

Welding Lugs on Gear Cases

THE accompanying illustration shows some special gear-case lugs which have been designed and constructed in the Easton shops of the Lehigh Valley Transit Company. The lugs are of cast steel and are arranged for welding to the sheet-iron gear cases. When repairs are made the gear cases are welded throughout and the lugs are welded

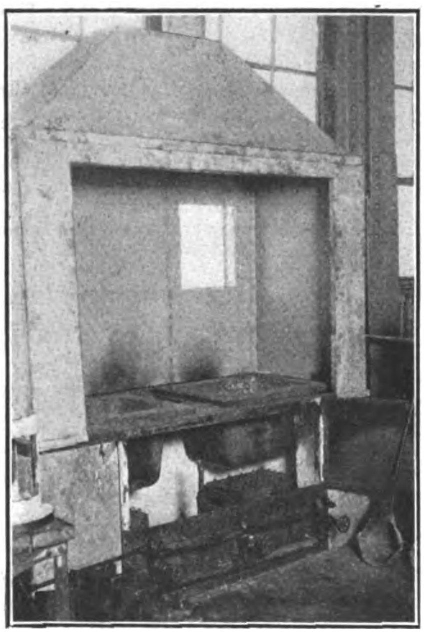


Gear Case with Welded Lug

in place. A V-shaped recess is provided around the edge next to the gear case so that metal can be deposited by the electric arc.

Twin Babbitt Pots in Westchester Shop

THE installation of a pair of twin babbitt pots has recently been completed by the New York, Westchester & Boston Railway at its Union Port Road shop. The pots are 14x18x12 in. deep and are placed about 6½ in. apart. Special gas burners, designed by J. T. Hamilton, master mechanic, are used to heat them. The lower part is housed in a fireproof compartment with a metal door for access to the burners. The upper part is entirely surrounded by a galvanized iron hood with a large opening located in the front to give access to the babbitt pots. In the back, two holes, one of which appears in the illustration, have been made, through which the light of a near-by window enters and illuminates the working area. At the top, the hood tapers to connect with a flue discharging the gases outside.



These Recently Installed Babbitt Pots Are Heated by Special Gas Burners

The pot on the left-hand side is used for preheating the material to be babbitted. Whatever old metal, dirt or grease is on the bearing is melted off during the preheating process. The piece is removed, cleaned, thoroughly tinned, and then babbitted in the right-hand pot, where only pure babbitt metal is present. By this means, the quality of the babbitt metal applied to the bearings is much improved. None of the impurities on the worn piece are incorporated into the finished product. Another advantage of the new installation lies in the fact that the babbitt pots are larger than the one previously used in this shop and will, therefore, accommodate pieces which formerly could not be immersed in the pot, but had to be treated in other ways.

New Equipment Available

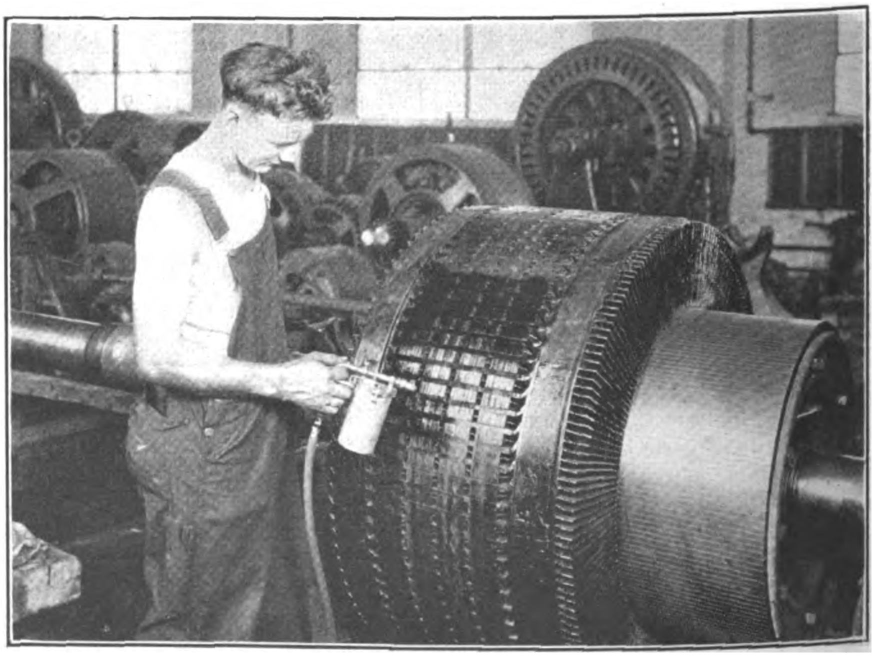
Low-Pressure Air Brush Saves Paint

A Better Finish to the Job, Diminution of Fumes and a Smaller Power Consumption Are Other Advantages Claimed for This Apparatus

PROPER laying out and flowing of either varnish or paint requires the natural evaporation of the solvent after the coating has been applied. High-pressure spray-painting apparatus is said to cause the evaporation of much of the solvent in the paint before the material reaches the surface. The fundamental principle in air brush painting therefore is the use of the lowest possible pressure consistent with speed and perfect atomization of the material, according to the Eclipse Air Brush Company, Newark, N. J., manufacturers of a new low-pressure air brush. This apparatus operates at a pressure varying from 25 to 35 lb. per square inch in contrast to the ordinary outfit which requires from 60 to 100 lb.

In an attempt to avoid undue evaporation when using a high-pressure air brush, the paint is often piled on in a more or less dry condition, producing a stippled finish. An excessive amount of material may thus be used. On the other hand, at the low pressure it is claimed that the normal amount of solvent is left in the material, so that the varnish, shellac or paint flows out naturally.

Besides the saving in material, which, it is said, quickly pays for the initial cost of the low-pressure air brush, there are several other advantages claimed for it. Better working conditions obtain because of the diminution of fumes. A better finish results because the physical properties of the material are not changed during the application. Saving in labor is also effected because the even surface obtained by a low-pressure application requires less rubbing down. The power consumption is about 50 per cent less than with a high-pressure air brush, it is claimed, because the Eclipse requires only half as much volume and pressure. No special preparation of the paint for spraying is necessary, as it can be used through the machine at the same consistency as when applied with a hand brush.



This Low-Pressure Air Brush Can Be Used to Apply Insulating Varnish to Armature Coils After Assembling

The News of the Industry

Interurban Wages Adjusted

Indiana, Columbus & Eastern Traction Settles Wage Scale in Conference with Its Men

Trainmen on the interurban and city lines of the Indiana, Columbus & Eastern Traction Company receive wage increases of from 5 to 6 cents an hour under the terms of a new wage agreement signed by officials of the company and representatives of the employees in Springfield, Ohio, on Aug. 18. The new scale is effective for a period of one year. It is retroactive to Aug. 16. The new scale in cents per hour is as follows:

INTERURBAN CONDUCTORS AND MOTORMEN	
First three months	41 cents
Next nine months	49 cents
After first year	52 cents
INTERURBAN BRAKEMEN	
Straight	40 cents
CITY LINES (Bellefontaine, Ohio)	
First three months	39 cents
Next nine months	44 cents
After first year	49 cents

The contract also contains a clause providing for 3 cents an hour additional to the regular scale for the operation of one-man cars should the company decide to operate this type of car at any time. A similar clause has been contained in the contracts for the past three years.

FIVE CENTS AN HOUR MORE

The new scale provides increases of 5 cents an hour for both interurban and city conductors and motormen, and 6 cents for brakemen. The agreement is subject to the approval of Federal Judge John M. Killits as the company is in receivership, but the approval of the court is expected to be forthcoming.

The trainmen submitted a proposal to the company on Aug. 1, asking an increase of 10 cents an hour. A conference was held in Springfield on Aug. 9, at which time the company's financial status was explained to the employees. Representatives of the men then agreed to ask the employees to reconsider their demand. This was done, and as a result the employees modified their demand to 5 cents an hour.

In discussing the modification by the men, John S. Bleecker, general manager, said:

> It is an encouraging sign that the men were willing to recognize our problems. They knew after we laid the cards on the table just about how much we could pay them in increased wages and still provide for our budget of repairs and extensions without which we cannot give the improved service to attract more patronage and keep the lines in operation. It is an encouraging sign that the whole I., C. & E. family is imbued with the spirit to give better service to the public and to exert every effort to increase and improve our facilities.
>
> The company is now in receivership and needs a great deal of money to build up the property. We are doing the best we can to get back patronage by providing better facilities.
>
> Our budget of improvements, repairs and extensions for 1923 totals $111,000. We estimated we will have this amount for this purpose, and judging from actual earnings so far this year we will come close to that figure.
>
> Of that amount, about $45,000, or nearly one-half, is estimated to be necessary for franchise requirements, such as rebuilding tracks and paving streets in the cities and towns through which the lines pass. Another $42,000 is necessary for extensions, improvements and modifications of the system. These include a new power line at Bellefontaine, improvements to the telephone system to facilitate car dispatching, purchase of gasoline power cars for the section workmen and the cash payment for six new lightweight cars for use on the Dayton-Union City division.
>
> This leaves about $25,000 of the estimated $111,000 which can be diverted to make up the increase for the trainmen. The increase totals about this amount in a year.

OTHER NEGOTIATIONS UNDER WAY

The wage agreement between the Columbus, Newark & Zanesville Traction Company also expired on Aug. 16, but negotiations for a new scale have not been completed. The C., N. & Z. trainmen also asked for a 10-cent increase, but a counter proposal was submitted by the company, the terms of which have not been made public. Mr. Bleecker expects an early settlement on the latter line. The C., N. & Z. line is not in receivership. Negotiations between it and the employees are conducted separately from those of the I., C. & E.

Strike Reprisal Threatened at Fairmont

Possibility of a strike exists affecting all the employees of the Monongahela-West Penn Public Service Company operating at Fairmont and Parkersburg, W. Va., and Marietta, Ohio. This is indicated in an announcement made by C. R. Boyles, chairman of the strike committee of the International Brotherhood of Electrical Workers, that a sympathetic strike against the company is impending.

As matters stood a few days ago more than 150 members of the union have been on a strike since June 30, the company not having negotiated a new wage scale with certain classes of workers in the union. The strike, however, has not applied to trainmen, being confined to groundmen, linemen and other electrical workers. The utility company has shown a willingness to increase the scale of pay to the electrical workers to some extent, but not to as great an extent as demanded by the strikers.

The trainmen employed by the company and the company itself are on amicable terms and employer and employee are working together for the improvement of public service.

Raise for Municipal Men

Board Considering Wages for Detroit Employees Awards Men a 10 per Cent Advance

Department of Street Railway employees in Detroit have been granted an increase in pay averaging 10 per cent by the board of arbitration. The award was announced on Aug. 18. The men were allowed approximately half the increase they had demanded. The increases named range from 5¾ cents to 7½ cents an hour, effective for six months from June 1 to Nov. 1. The decision of the board was signed by all three arbitrators.

The total of the increase in wages under the award will, it is estimated, amount to $300,000 for the six months. W. D. Mahon, international president of the Amalgamated, recommended that the men accept the terms.

Under the new agreement the men will receive 62 cents an hour for the first six months; 66 cents an hour for the next six months; and after one year's service, 70 cents an hour. One-man car operators will receive 5 cents an hour more than regular platform men. Overtime will be paid for at 75 cents per hour as before. For Sunday and holiday work the men will be paid 95 cents an hour for time in excess of eight hours, and for owl car work 80 cents an hour. One-man owl car operators will get 85 cents an hour.

SCALE FIXED FOR SIX MONTHS

The city can take action to have the wage scale changed at the end of six months or the schedule can be allowed to stand for a longer period if it is thought desirable to do so. In fixing the period at six months the arbitrators had in mind statements made before the board to the effect that officials of the railway department had had under discussion the submission to the voters of an amendment to the city charter which would relieve the department of taxes and paving between the tracks. The amendment can be submitted to the voters at the fall election, according to Judge Dingeman, chairman of the board of arbitration in the wage dispute.

In commenting on the men's request that the question of schedule runs be more definitely defined, the arbitrators stated that the commission is substantially complying with recent promises to arrange schedules so that as many runs as possible can be completed in the eleven hours. This policy is expected to be continued.

Employees of the railway have contested the opinion that they are not city workers. They claim that as city employees they are not liable for the payment of the income tax. It is the opinion of the internal revenue office that under the terms of the deal by which the city took over the Detroit United Railway, the men could not in reality be classed as city employees.

William B. Mayo, general manager of the railway, stated before the arbitrators that if the men had waited a little longer before presenting their demands and following up the demands to the point of arbitration, the department could have handled the matter much better and the men would have been entirely satisfied.

An increase in fares was announced on Aug. 21 intended to produce sufficient revenue to enable the city to meet the wage award. This development is referred to elsewhere in this issue.

Initiative Election at Birmingham on Aug. 28

Preparations are being rushed for the initiative election on the jitney men's ordinance offered as a substitute for the city jitney regulations, which practically put jitneys off the streets of Birmingham, Ala. The election is called for Aug. 28, the final check of the election petition showing the signatures of slightly more than the required 1,500 qualified voters necessary to call the election.

Jitney men are making a personal canvass, largely confined to passengers in their cars. The City Commission has appealed to civic organizations to make a campaign in favor of the settlement effected with the Birmingham Railway, Light & Power Company and against the jitney men's ordinance. Plans have been made for a short speaking campaign in favor of the city's ordinance, if it is found necessary.

Commissioner Urges Miami to Take Over Railway

The city of Miami, Fla., may take over the operation of its railway lines in the near future. This has been revealed in a statement by C. D. Leffler, City Commissioner. According to Mr. Leffler, the city commission has received no official communication from the Fisher interests, operating the Miami Beach Electric Company, but some of the commissioners have spoken informally with representatives of the Fisher interests. Mr. Leffler said:

> Personally, I hope that some arrangements can be made for the Fisher interests to continue the operation of the lines until more mileage is secured. It would be ridiculous for two 5-mile car lines with connecting tracks to operate under two different organizations, two sets of mechanics and other duplications which would be necessary should the city take over the local lines.
>
> The city has only 5¼ miles of tracks and I should like to see the Fisher interests continue to operate the lines until we have at least 12 miles of tracks. When the City Commissioners receive some formal communication from the Fisher interests, the commission will take action on the matter.
>
> The Fisher interests do not say they have lost money in the operation of the lines, but say that when the damage suits are taken into consideration they have lost money.

Making Money for Merchants

Jealous of the Real Estate Values Built Up by Railway, Davenport Merchants Kill Rerouting Scheme

An offer on the part of the Tri-City Railway, Davenport, Iowa, to reroute its lines at a cost of $400,000 and to increase the service 34 per cent during the peak hours has been turned down by the City Council following several months' consideration. The rerouting plan would have necessitated the removal of some forty-four blocks of track and the laying of several new passing tracks and of some six blocks of new connecting lines.

It would have resulted in operation economies which would have justified the expense of starting the system, according to R. J. Smith, manager of the lines. At present there are many parallel lines, the service on some lines is delayed at grade crossings and one loop in northwest Davenport makes the entire system unwieldy.

The company offered to provide bus service in the outskirts to replace the ends of some of the existing lines intended to be cut off if the rerouting plans were put into effect. These bus lines would have served the residents of a rapidly developing section which now largely without street car transportation.

Opposition to the proposal developed from the business interests on Brady Street, the main north and south street of the city, the greater part of it double tracked. The rerouting plan would have sent the Vander Veer Park cars, which serve the outlying Brady Street section, over Harrison Street, two blocks to the west.

The Brady Street merchants, including the city's largest department store and two banks, one of which has just announced a $1,000,000 loop office building, contended that the change would upset real estate values created in that section by a railway line which had remained unchanged since it was built. These merchants also contended that their business would be carried elsewhere by the new routing system.

The extensive program of new paving which the city had planned was brought into the discussion as it was the desire to complete this paving as soon as possible and all parties were desirous of settling the rerouting in order that the contractors might proceed with their paving work.

The railway offered to pay without protest the paving tax apportionment on streets where it would take up and abandon trackage under the proposed plan. It was realized by all that this new paving would seal the fate of any future street car line changes for many years to come as the expense of tearing up brick or concrete or asphalt once it had been laid would be prohibitive.

In the plan better service on practically every line in the city was specified, the proposal calling for a car every five minutes during the rush hours on some main lines and more cars at more frequent intervals on other lines.

The plan was considered at citizens' meetings, at civic club gatherings, at open meetings of the City Council and at conferences between business men and the company officials and between Aldermen and the company officials. While the Council seemed to be practically won over to the proposal the business interests could not be convinced and it is regarded as largely due to this attitude that when the plan came up for final decision before the City Council it was lost by a vote of four to two.

Bust of Colonel Strickland to Be Erected in Dallas

In honor of the late Col. J. F. Strickland of Dallas, Tex., who was president of four of the public utility companies having headquarters in the Interurban Building, Dallas, a bronze bust will be erected to his memory in the waiting room of the Interurban Building. Subscriptions are being taken among the more than 3,000 employees in the building, and it is intended that the entire cost shall be borne by the employees, with whom Mr. Strickland was especially popular. At the time of his death Colonel Strickland was president of the Texas Electric Railway, Texas Power & Light Company, Dallas Power & Light Company and the Dallas Railway. It is due largely to his foresight and energy that Texas now ranks high among the states in the development of the electrical industry.

Lima Strike Broken — Company and Men Use Buses

For the first few days of the strike of the forty-three trainmen of the Lima City Street Railway, Lima, Ohio, the company ran buses on the streets to handle traffic. It charged the regular rate of fare of 7 cents cash or four tickets for a quarter. Now, however, the company is actually operating twelve cars a day with men employed to replace the strikers. The company operates only eighteen cars during the normal hours of the day so the strike is apparently broken and the company feels it unnecessary to continue to operate buses.

The strikers also resorted to the use of the bus. Their idea of course was to take business away from the company. Not having any permission from the City Council to run buses the former railway men could not charge any fares, but were forced to depend upon donations from the public to meet their costs.

The men at Lima went out on strike at midnight on Aug. 11 to obtain recognition of the union and an increase in pay of 10 cents an hour.

The company refused to sign any agreement with the union. Consequently the men quit and there has been no wage discussion.

New Jersey Railway Suggests Settlement Plan

Adjustment of Wage, Valuation, Fare, Jitney and Other Questions All Included in Offer of Service Resumption—Commission Regards Proposal as Offering Basis of Negotiations—Hearing Called for Aug. 28

A PLAN of settlement of the transportation crisis in New Jersey was offered by the Public Service Railway on Aug. 21. This was in accordance with the promise made to the Board of Public Utility Commissioners by E. W. Wakelee, vice-president of the company, at the public hearing befor the board on Aug. 14. In presenting the plan the company says that "it is possible to settle this whole problem and it should be done once for all." In conclusion it says that it is prepared to resume service temporarily at the rate of fare in effect when the strike was called, at the new wage scale, upon certain assurances from the commission and the representatives of the more prominent municipalities. The proposal was signed by President Thomas N. McCarter. The plan provides among other things for:

A basic pay of 60 cents an hour, or a 20 per cent increase. The men were demanding 65 cents an hour, or a 30 per cent increase.

A 7-cent straight fare and a 1-cent transfer fee, to replace an 8-cent cash fare and a 1-cent transfer fee.

The purchase by the company of all the bus lines in competition with the surface cars on streets where tracks are laid, on July 31, the day before the strike was called.

The rerouting of bus lines whose owners will not sell.

A valuation of $110,000,000 for the property.

It is set out that the plan will involve the expenditure of several million dollars, financing of which has been provided for, conditioned upon the approval of the whole plan by the commissioners.

The preamble and the plan follow in full:

Public Service Railway Company

Plan of Settlement of Transportation Crisis Offered by Public Service Railway Company

"Newark, N. J., Aug. 21, 1923.

"Public Service Railway Company, mindful of the burdens that have been heaped upon it during the past five years, reaffirms its determination that it cannot contract to pay out large sums of money for wages in excess of its revenues available for that purpose, but conscious of its obligations to the people of New Jersey, and desirous of meeting the local transportation needs of that portion of the state served by it, offers the following comprehensive plan, as an entirety, for the settlement of the very serious problem that now confronts the state. If it were otherwise practicable, nothing would be gained by a resumption of operation upon a basis of destructive and uneconomic competition such as has latterly existed. It would only result in a repetition of the present unfortunate situation at a later date. In no large community in the United States does any such condition exist as has been the case in New Jersey. It has been ascertained by hard experience the country over that cars and buses cannot economically exist in direct competition with each other upon the same streets, and wherever the issue has arisen the necessity for railway transportation has manifested itself. It is possible to settle this whole problem and it should be done now once for all.

Plan

"1. Although the railway company has never had a desire to embark largely in bus transportation, nevertheless a situation has developed that must be met in a broad way, if local transportation is to survive, therefore the railway company, acting through an allied corporation, will purchase at their present fair physical value all buses operating competitively on July 31, 1923 (the day before the commencement of the strike) on the streets where railway company's tracks are laid whose owners are willing to sell. This present value to be agreed upon, if possible, between the company and the respective owners of the buses. If unable to agree, value shall be fixed by an independent appraisal. This will involve a capital investment of several million dollars, the financing of which, after much negotiation, has been provided for, conditioned upon the adoption of the plan as a whole.

"2. Thereafter the companies will operate cars and buses in co-ordination to the extent found necessary to accommodate the traffic and under the supervision of the municipal authorities and of the Board of Public Utility Commissioners. This will end the wasteful and uneconomic competition that has hitherto existed. As opportunity offers, buses operated will be modernized and standardized. Transfers will be instituted between buses and cars in the manner heretofore existing on the lines of the railway system. While ample service will thus be provided, at the same time much unnecessary traffic congestion will be removed from the highways. This, it may be said, will create a monopoly. This would only be so, as to streets where railway tracks are laid. Such service is a natural monopoly, like the telephone, water, gas and electricity. That such is the fact is the reason for state supervision and control. The ignoring of this economic principle is the chief cause of the present crisis.

"3. The licenses of all bus owners who sell to the company, and of those having temporary permits, shall be rescinded and canceled, and the licenses of bus owners who do not desire to sell shall either be rescinded or the buses shall be rerouted on streets where there are no street railway track. The power of the Board of Public Utility Commissioners as contained in the public utility act as amended by the so-called Elliot act of 1921 is ample to accomplish the result within a very reasonable time, if the board will exercise it. The municipalities and the board, acting together, can accomplish the result whenever they see fit. That it is the duty of the board to thus act is made clear by the opinion of Judge Katzenbach in the recent case in the New Jersey Supreme Court of Arthur A. Hunter vs. Board of Public Utility Commissioners, where the Justice in his opinion speaks as follows:

> "While temporarily the public might have greater facilities of transportation in Woodbury and from Woodbury to Camden by permitting the prosecutor to compete with the railway company, in the end such competition is not for the public convenience and interest as it either results in less efficient service by the railway company or abandonment of its service because the operation of the line will not pay operating expenses and a fair return on the capital invested. The state assumes to regulate the rates for transportation and the character of the service rendered. Morally and legally it should protect the business of the established utility from impairment and encroachment. To do otherwise would soon create a situation where the public would be without transportation service. No capital could be obtained for an enterprise where no security was afforded the investor. Without capital there would be no transportation facilities which in this age are indispensable to the transaction of business and the enjoyment of life."

"Two cases in the state of Illinois have recently enunciated the same doctrine. They are Joseph K. Choate, receiver, and others versus the Illinois Commerce Commission and the West Suburban Transportation Company vs. the Chicago & West Towns Railway.

"4. No competitive bus licenses shall be issued hereafter for operation on streets where railway company's tracks exist.

"5. The companies will promulgate a new wage scale with a basic maximum of 60 cents per hour, this being the last figure which the men agreed to accept, and is 10 cents per hour, or 20 per cent in excess of the present schedule. This involves, of course, 5 cents per hour extra for one-man operated car or bus. So far as the labor situation will permit, no one will be required to work more than six days in any week. Other working conditions can be left to the management and the employees to adjust satisfactorily.

"6. Both sides shall agree that the report of former Judge Thomas G. Haight, the Master in the pending rate case, fixing the value of the property of the railway company devoted to the public use, as of the date specified in his report, at $110,000,000 as therein set forth, be confirmed by decree. This valuation was arrived at by the Master appointed by the Federal court after considering the whole subject, with the aid of counsel for both parties, for one year and one-half. It is some million dollars less than the valuation fixed by a firm of independent engineers employed by the state of New Jersey, at a cost of approximately one hundred thousand dollars, after nearly one year's study of the problem. It is in excess of the amount fixed as the value in the summer of 1921 by the then Board of Public Utility Commissioners, which, under the law, was obliged to find a value after a few week's consideration. Necessarily such consideration did not admit of so complete an investigation as was made either by the state engineers or by the Master of the Federal court. It is essential to adjust this matter at this time because while the Federal suit remains undetermined, the injunction stands and the change in fare referred to in the next paragraph cannot be made.

"7. Simultaneously with the effectuation of the plan, the companies shall put into effect both on cars and buses a fare of 7 cents, with 1 cent for transfer. This fare is lower by 1 cent for transfer charge than that fixed by the Board of Public Utility Commissioners as a just and reasonable fare in 1921 upon the low valuation found by the board and with a lower wage in effect than that contemplated in this plan. This fare will stand comparison with any company operating under at all similar conditions and is less than the average of present street railway fares in the country. It may be decreased as and when the cost of service, including a fair return upon the value of the property devoted to the public use will admit. Such a reduction could be accelerated by support of the plan by the public, by the employees, by the removal of unjust paving obligations now enforced upon the railway company and by the reduction of present burdensome taxes.

"8. The companies will give employment, either on cars or buses, to all bus drivers who are qualified and can pass the railway company's usual tests of employment.

"9. After the plan has become effective, the company will take up with the Board of Public Utility Commissioners the revamping of its financial structure so as to provide for future financing and to place the company upon a sound financial basis.

"10. Service can be resumed, temporarily at the rate of fare in effect when the strike was called, at the new wage scale, upon the railway company receiving definite assurances from the Board of Public Utility Commissioners and from the representatives of the more prominent municipalities that the plan is acceptable and that they will co-operate with the railway company in carrying it into prompt execution. It is impossible for the railway company to resume service at the rate of wages demanded by the men and under the conditions in other respects that prevailed prior to the first of August.

"Public Service Railway Company submits this plan to the deliberate and intelligent consideration of the Board of Public Utility Commissioners of the state of New Jersey, the authorities of the interested municipalities and of all fair-minded people.

"PUBLIC SERVICE RAILWAY COMPANY
BY THOMAS N. MCCARTER, PRES."

A veritable flood of comment followed the making public of the company's statement. It was given out to the press early in the morning for use in the evening papers, nearly all of which appear on the streets before noon. It was also published by the company in full as a page paid ad in the New Jersey papers and appeared as an advertisement in the New York evening newspapers of Aug. 21 and morning papers there of Aug. 22.

The Public Service Commission delayed its reply to the company's offer until the evening of Aug. 22. It then gave out a statement for use in the papers of Aug. 23. While some of the features of the plan do not appeal to the board as practical, the board regards the proposal as offering a basis for discussion and conference. It accepts it as an effort on the part of the company to end the present situation. While it takes exception to some details of the plan, the board believes that it should be given fair consideration by all whose co-operation would be required to make it effective in whole or in part. It has therefore called a hearing for Aug. 28 to afford the company, municipalities and others affected an opportunity to discuss the plan or any other plan which may be submitted for consideration.

The board said:

"The suggestions submitted are in the main the following: the elimination of bus competition and the method by which this result is to be attained; wages; valuation; fare, and, lastly, resumption of service.

"The last suggestion should be adverted to first. The assumption by the company of the right to suspend service until this board and 'representatives of the more prominent municipalities' give definite assurances to co-operate with the company in establishing its new rate of fare, in eliminating competition of buses by purchase or otherwise, in removing paving obligations and burdensome taxes is unwarranted and a menace to public welfare. It amounts to a strike on the part of the company. A strike against all the public.

"If the company's right to do this is conceded it will apply not only to trolleys but to all other utilities, including water, gas and electric companies. They would have the right to make demands and suspend service until their demands are complied with. The result would be disastrous and jeopardize the health and safety of the public. The company claims that it is financially unable to operate. If this be true, the law provides a method of procedure under which the company's system may be operated and its rights preserved.

"Even if the plan is favorably received, it will take some time before the variant interests can be brought into accord, during which time the public should not suffer the loss and inconvenience which the suspension of service entails.

"The details of the plan other than that relating to the resumption of service will be dealt with in the order in which they are submitted.

"1 and 2 relate to the purchase and control of competitive buses by the trolley company. This can only be accomplished by an agreement, in the first instance by the company with the municipalities and the bus owners, and the board will call a hearing to ascertain their views.

"3. The company proposes that all licenses of bus owners who do not desire to sell their buses to the company shall be rescinded or the buses rerouted. It states that the power of the Board Public Utility Commissioners is ample to accomplish this result. This is a misstatement of the law. The decision quoted by the company does not apply. Under the Elliott Act of 1921 referred to by the company the board has no jurisdiction or control over buses now operated by anyone who obtained a license prior to March 15, 1921. The board has jurisdiction over about 275 buses only, out of some 1,700 now in operation.

"4. The company proposes that no competitive bus licenses shall be issued hereafter for operation on streets where the railway company's tracks exist. Licenses are not issued by the Public Utility Commission. They are issued by municipalities. Licenses issued subsequent to March 15, 1921, except renewals, to be valid, must be approved by the board if the bus is to be operated on the same street as the railway. The board has not approved any licenses for buses except upon proof of public convenience and necessity. The board has imposed restrictions, when licenses have been approved by it, to protect the street railways from unfair competition. This policy will be continued.

"5. The board has no jurisdiction concerning the promulgation by the company of a new wage scale.

"6. The company proposes that the board shall agree that the value of its property shall be that fixed by the master in the rate case now before the United States District Court. The board after exhaustive hearings and in accordance with an act of the Legislature, so directing fixed what it believed to be the fair value of the company's property. It would not be lawful for the board to fix another and different valuation by agreement with the company.

"7. The company proposes that a fare of 7 cents with 1 cent for a transfer shall be put into effect both on cars and buses. Upon many of the buses now in operation the fare is 5 cents. The fare of the Public Service

Railway now being charged is 8 cents plus 1 cent for a transfer. While the company's proposition would decrease the fares to those using the street cars, it would increase materially the fares to those using the buses. It is the board's duty to fix just and reasonable rates of fare with due regard to all conditions. The board cannot relieve itself of this duty and if the company is to have the benefit of the increased fare and additional patronage of the bus operation and is to be relieved of paving obligations and allowed a reduction of taxes a further investigation would be necessary to determine whether the fare proposed is a reasonable one.

"8. The company proposes that all bus drivers who are qualified shall be given employment either on cars or buses. This is a detail of management not within the authority of the board to control.

"9. The company states that after the plan has become effective it will take up with the Board of Public Utility Commissioners the revamping of its financial structure so as to provide for future financing and to place the company upon a sound financial basis. The board, within the limits of its authority and with due regard to the public interest, would co-operate in such plan of financing as would enable the company efficiently to perform its public duties.

"10. The company states that service can be resumed temporarily upon the receipt by it of definite assurances from the Board of Public Utility Commissioners and from the representatives of the more prominent municipalities that its plan is acceptable and that they will co-operate with the company in carrying it into prompt execution. As above indicated, such a suggestion is untenable. The board can neither waive the law, delegate its authority nor foreclose itself from acting in accordance with the authority vested in it by the Legislature."

Meanwhile announcement was made of a conference on the morning of Aug. 22 between representatives of the company and the joint conference board of the strikers. At the conclusion of this conference Mr. McCarter is reported to have said:

"We have discussed in a general way the details together and I am happy to say the men approve it."

Mr. Busby's Farm Turns Out to Be a Mine

Thirty years after the ore from the famed Iron Mountain of Missouri was believed to have been exhausted, ore from the mountain is again being reduced to pig iron in St. Louis. To Leonard A. Busby, president of the Chicago Surface Lines, is due credit for the return of this famed iron mine as a factor in the pig iron industry of the Middle West.

In 1890 mining experts contended that the ore deposits of Iron Mountain had been exhausted. Finally Mr. Busby bought the land for use as a stock farm. Quite recently Major William T. May, a mining engineer, asked permission of Mr. Busby to examine his property. He concluded that the experts were wrong who had ventured the opinion that Iron Mountain ore deposits had been exhausted. He showed the results of his work to Mr. Busby in Chicago, and convinced him that the property could be used again for mining. Revised estimates of the value of Mr. Busby's property place it at $10,000,000.

Wages in Covington Correspond to Those in Cincinnati

The Cincinnati, Newport & Covington Railway has signed a new wage agreement with its employees on the same basis of the award of the arbitrators in the wage dispute of the Cincinnati Traction Company. The new agreement expires on June 30, 1924, and is retroactive to Aug. 5. Platform men are to receive an increase of 5 cents an hour, from 48 to 53 cents. Curve cleaners are to get 40 cents an hour, an increase of 8 cents. Crane men are to receive 65 cents, an increase of 15 cents an hour over present pay.

Substitutes are to receive a minimum wage of $90 a month. The former minimum was $75. This is equivalent to five and one-half hours pay a day. Regular men are to be required to run only ten "extras" a month instead of fifteen "extras" as before, except in case of emergency. The regular runs are fixed at nine and one-half hours a day.

Hearing on Spartanburg Abandonment Will Go Over

Attorneys for the South Carolina Gas & Electric Company, Spartanburg, have secured from the Supreme Court an extension of ten days in which to answer the application for a writ of mandamus asked for by attorneys for the city to compel the company to restore electric railway service. Attorneys for the city will have ten days in which to file an answer to the answer of the attorneys for the company, so the argument before the Supreme Court cannot be had on Aug. 28, the date originally fixed. The date for the argument will be fixed by the court, but it is understood that it will not be delayed any longer than is found to be absolutely necessary.

As indicated in a review of the situation in the ELECTRIC RAILWAY JOURNAL for Aug. 11, page 229, the petition of the city to the court for the writ of mandamus claimed that the Railroad Commission did not have the power to issue the order of June 22, which authorized the abandonment of service in Spartanburg on July 21.

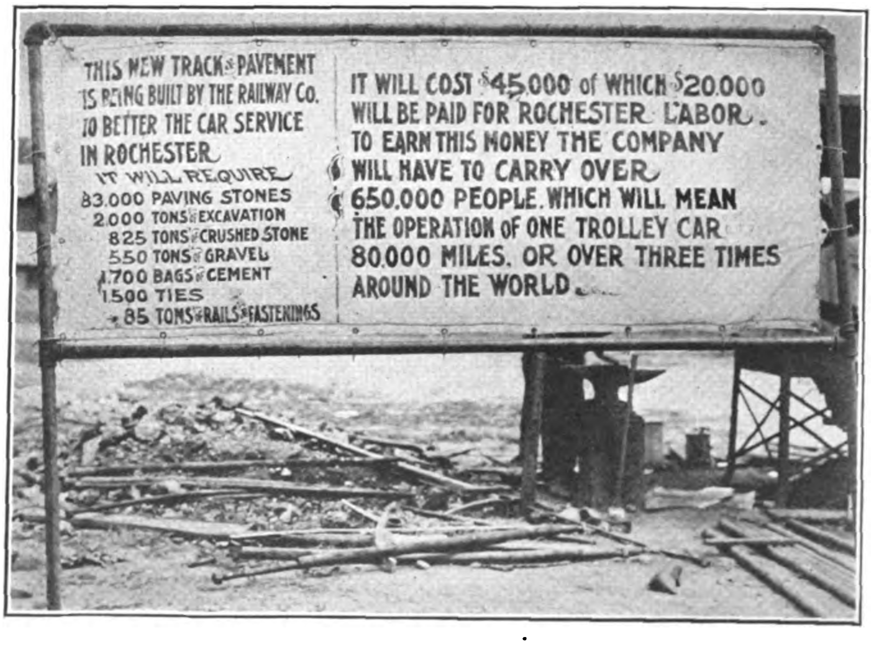
Sign Informs Public of Improvement Expenses

The New York State Railways is explaining to the public in Rochester, N. Y., the cost of relaying tracks in North Street. To convey its message the company has erected a sign, which is an innovation in the educational campaign of the railway.

It is expected by the railway company that this plan of informing the public will be duplicated in other future improvements. James F. Hamilton, president of the New York State Railways, maintains that the general public is not cognizant of the tremendous expense entailed in the financing of the system and the sign is part of a campaign to counteract agitation for reduced fares, for which Mr. Hamilton holds there is no justification in view of present operating and maintenance costs.

The sign contains the salient facts concerning the cost of the North Street work. It was erected with the consent of Charles R. Barnes, Commissioner of Railways for Rochester.

The railway at Rochester is operated under a service-at-cost arrangement.


THIS NEW TRACK & PAVEMENT
IS BEING BUILT BY THE RAILWAY Co.
TO BETTER THE CAR SERVICE
IN ROCHESTER
IT WILL REQUIRE
83.000 PAVING STONES
2.000 TONS of EXCAVATION
825 TONS of CRUSHED STONE
550 TONS of GRAVEL
1.700 BAGS of CEMENT
1.500 TIES
85 TONS of RAILS & FASTENINGS
IT WILL COST $45.000 of WHICH $20.000
WILL BE PAID FOR ROCHESTER LABOR.
TO EARN THIS MONEY THE COMPANY
WILL HAVE TO CARRY OVER
650.000 PEOPLE. WHICH WILL MEAN
THE OPERATION of ONE TROLLEY CAR
80.000 MILES. OR OVER THREE TIMES
AROUND THE WORLD.

Telling the Story of Costs to the Public of Rochester

Wages Raised by D. U. R.

The wages of employees on all interurban lines of the Detroit United Railway and on the Pontiac and Flint city lines have been increased 6 cents an hour to 61, 64 and 66 cents, the hourly rate depending upon the length of time the employee has been in the service of the company. An increase of 6 cents an hour has also been granted platform men on the city lines in Ann Arbor and Mt. Clemens, but these men still receive 2 cents an hour less than the prevailing rate on the other lines. One-man car operators receive 5 cents an hour more than the rates just mentioned.

Candidates at Schenectady Will Talk Strike

The strike of the employees of the Schenectady Railway is expected to play an important part in the municipal elections this fall. The present Mayor, Clarence A. Whitmyre, inherited the office when George R. Lunn assumed the office of Lieutenant-Governor. He is the Republican candidate for election to the office. Opposed to him in the primaries will be W. W. Campbell, who has served as a member of Assembly for the past three years. Mayor Whitmyre is opposed by many members of the Republican organization due to the retention in office of Democratic incumbents. He will appeal to the voters for support on his record of having handled the strike situation in accordance with the wishes of the trolley workers and the general public. Assemblyman Campbell, however, is quite popular with the labor organizations, and has been an active supporter of their feature legislation.

News Notes

Another "Trolley Topics" Appears.—To furnish a better understanding of the company and to give a little amusement to its patrons the Spokane (Wash.) United Railways some time ago started the publication of a semi-monthly pamphlet called "Trolley Topics."

Safety Council Formed.—With the aim to regulate traffic the organization of the Nashville Safety Council was recently perfected at a meeting of the Board of Control. The following officers were elected: J. P. W. Brown, general superintendent Nashville Railway & Light Company, president; Watkins Crockett, treasurer, and James S. Patrick, secretary-manager. The executive committee met with Carl L. Smith of Chicago, secretary of the National Safety Council, to discuss further plans.

Many Attend Picnic.—The annual picinic of the East St. Louis & Suburban Railway employees was held at Jones Park, East St. Louis, on July 24. Approximately 10,000 persons attended. All work except that absolutely necessary was suspended for the day. Every person present wore a large yellow button and persons finding another wearing their number received a beautiful gold pencil. Guests from Alton, Belleville, Collinsville, Edwardsville, Lebanon and other points along the company's lines made the trip to and from Jones Park in special cars.

Urges Again Constructive Criticism.—In seeking constructive criticism from its patrons and employees the Monongahela-West Penn Public Service Company has recently printed an advertisement in the papers of Fairmont urging its patrons to continue to send suggestions for better service as so many have proved of great value to the company. The "ad" states that a new and special department comprised of officials and employees has been originated to handle the ideas of the public. The company announces that it values its patrons' friendship as it does their patronage.

Must Seek New Quarters.—The Alton, Granite & St. Louis Traction System, a subsidiary of the East St. Louis & Suburban Railway, and the city lines of Alton, Ill., also controlled by the same interests, will be forced to obtain new quarters. The city of Alton in August will hold a special election to vote $74,000 in bonds for the remodeling of its city hall, and after the work is completed the structure will be devoted entirely to the city offices. At present the Alton offices of the street car company are located in the city hall, which is conveniently situated and highly desirable from the street car company's point of view.

Want Town Painted Orange.—The Galveston Electric Company has painted several of its cars an orange color as an experiment, and R. G. Carroll, vice-president and general manager, reports that he has received more than fifty letters commending the new color and asking that all the cars be given a coat of the same color. The brightly-colored street cars tended to brighten up the old town, the letters state, and some say that if the company would take the lead and paint all its cars, this might act as an incentive and induce others to paint up and clean up, and thus improve the civic appearance of the city. Mr. Carroll said all the cars of the company would be painted the new color as soon as possible.

Men Rewarded for Safety Records.—Fifteen motormen and conductors of the West Penn-Monongahela Company in the Clarksburg, W. Va., region, who have escaped being in a single accident in the month of April, May and June, were given a dinner by the officials of the company at the Waldo Hotel. Fifteen trainmen in the Fairmont region were banqueted because of their three months' safety record and the men of the Parkersburg region were likewise remembered. The Fairmont, Clarksburg and Parkersburg men are grouped into three teams of fifteen men each. These teams will compete in the next three months for highest honors and the team which wins will be treated to a trip. The safety campaign has become more effective each month since last Jan. 1 and men of the system are taking keen interest in it.

Wants Lines Restored.—Residents of the West Walnut Manor and Jennings districts, northwest of St. Louis, Mo., at a mass meeting held at Owls Hall recently appointed a committee to devise ways and means for having the former Jennings trolley line put back into service. The line, which operated between the end of the Bellefontaine division of the United Railways of of St. Louis at Robbins and Florissant Avenue, St. Louis, and Jennings road and Florissant Avenue, Jennings, with a branch line along Helen Avenue, was forced to quit business because of the competition of jitneys. Twenty-nine merchants and manufacturers and professional men have interested themselves in the movement to bring back the street car line.

Guess Right and Be Rewarded.—Paul Hodson, safety engineer for the East St. Louis & Suburban Railway, has planned a unique intelligence test for the patrons who travel on the Belleville division of the company. A key to a safety slogan is to be borne by each hat slip handed out by the conductors. There are thirty-one such slogans. The person sending in the largest number of correct solutions is to be awarded a month's transportation to and from work. The second award will be 400 1-cent coupon fares and for the third highest number of correct slogans 200 1-cent coupons. Mr. Hodson believes that this guessing contest will stimulate interest in the company's "safety first" campaign and impress upon all contestants and other patrons of the lines the full significance of the safety work.

Rules Obligation Have Terminated.—Any obligation of the city of Seattle to return about $11,000 in deposits on railway franchises granted the Puget Sound Traction, Light & Power Company, if it ever existed, has terminated under the statute of limitation, according to an opinion given to Chairman E. L. Blaine of the finance committee of the City Council by Corporation Counsel T. J. L. Kennedy. The opinion was asked in connection with a Council bill which provided return of the deposits. The company's request has been pending before the City Council for more than three years. An earlier opinion by the corporation counsel's office held that the city need not repay the money, the company having surrendered all rights under each franchise on selling the railways to the city. The company later reopened the question with a second petition, and Chairman Blaine asked whether the company's new claims altered the situation. Mr. Kennedy's last opinion held that the first ruling should not be altered.

Foreign News

City & South London Railway Extension

In regard to the recent rejection by a committee of the House of Lords of the part of the City & South London Railway bill, which sought authorization of a 6-mile extension of the railway from Clapham to a junction with the authorized Wimbledon & Sutton Railway, near Morden, to the southwest of London, an agreement has been reached. Under this, the railway would be extended through Balham and Tooting to North Morden, about a mile short of the original proposal, and all reference to the Wimbledon & Sutton Railway would be excluded.

Lord Ashfield, chairman of the City & South London Company, stated that under the agreement provision was made for car sheds on the extension. The cost of construction of the line (mostly tube tunnels) was estimated at £3,600,000, or about £1,000,000 less than the original scheme. Five stations on the extension would all be in a densely populated area, and he estimated that they would produce at least 23,000,000 passengers annually, while the other two stations would produce at least 5,000,000. At an average fare of 4d., the passenger receipts would be about £20,000, giving a total of £486,000. Expenses were put at £218,000 (5,500,000 car-miles at 9½d.), leaving a net revenue of £268,000. which would cover the interest charges on £4,000,000 of debentures at 4½ per cent, leaving a margin of £88,000. The new capital charges were further secured by the common fund of the underground railway companies, which in 1922 had a margin of £1,706,000 over and above the revenue liabilities of the five companies concerned, or sufficient to cover the interest on the new debentures ten times over.

Street Traffic Congestion in London

From time to time during the last generation or two an agitation has been renewed for the formation of a traffic authority for the whole of London to deal with growing congestion in the streets, but owing to local jealousies among multitudinous road authorities and also to political differences nothing has ever been done. Many years ago a Royal Commission composed of experts made an elaborate report recommending the formation of a Traffic Board for London with wide powers both of initiative and of coordination. Since then various Parliamentary committees have made similar proposals. Now that motor vehicle traffic is developing so rapidly the agitation has started afresh. The Ministry of Transport professes to have a scheme in hand, but when it will result in legislation to give effect to it is quite uncertain. Meantime the traffic congestion grows worse and worse.

Tramways and Bus Competition

The Municipal Tramways Association of Great Britain has appointed a committee to investigate the subject of motor omnibus competition with tramways and to take such steps as it may think proper in the interests of the association. In agreeing to borrow money for the reconstruction of a tramway section the Halifax tramways committee has instructed the town clerk to notify the local authorities concerned and to express the Town Council's hope that they will assist in making the route a success by refusing to grant any application for licenses to run buses in competition with the tramway.

Telephone Dispatching in London

A telephone control system has been put in operation on the northern section of the London County Council Tramways. All cars are supplied with keys to the roadside telephone boxes. From a central control station at Hackney nine lines radiate to all parts of the northern section, connecting 164 instruments with the traffic controller. The new arrangement permits of much more rapid summoning of the breakdown gang and rerouting of traffic in an emergency.

A British Experimental Electric Locomotive

One of the straws which show how the wind is blowing may be found in the report that the London, Midland & Scottish Railway is building an electric locomotive for experimental use on the line from Preston to Carlisle. Significance attaches to this because the route mentioned includes some of the severest railway gradients in Great Britain. It is part of the main line from London to Scotland of what, before the recent amalgamations, was the London & North Western Railway. The sharp summit, among the Westmoreland mountains, is at a great elevation.

Exposed Track in Leeds, England

A suburban extension of Leeds City Tramways which has been under construction for a long time has now been completed, and it is noteworthy from the fact that for a considerable part of the distance exposed track construction, as on a steam railway, is used. Only a very few electric lines of the sort, running along the side of the highway, are yet in use in Britain. The capital cost is lower than that of track construction with concrete foundations in paved streets; maintenance cost is also lower; higher speeds can be used. The plan can only be adopted, however, in suburban or rural areas where there is vacant land alongside the highway.

"The Borderlands of Glasgow"

This is the title of a guide book just published by the tramway department of Glasgow Town Council. Extending to 150 pages and well illustrated, there is much interesting descriptive matter, and particulars and instructions are given as to each route. It is pointed out in the preface that the object is to induce the citizens to take full advantage of the splendid opportunities afforded by the tramways of exploring the highways and byways described therein. The tramways reach various places of public resort and interest around the city.

Fourth Electric Railroad in Norway Opens

After being electrified, the Ofoben Railroad in Norway was ceremoniously opened to traffic on July 10. The road, which is 42 km. (26 miles) long, was originally built as a steam road and completed in 1902. It is located in northern Norway between the degrees of latitude 68 and 69 and runs between the seaport Narvik and the Swedish border, where it connects with the railroad on that side, which is also electrified. The road is normal gage (the same as in the United States) and the maximum grade is 1.73 per cent. The highest altitude is 522 m. (1,700 ft.) above sea level.

The chief reason for existence of this railroad is the transportation of iron ore from the vast deposits in Swedish Norrland. It is estimated that the rate of speed of the trains after electrification will be increased about 70 per cent and the capacity in proportion. In 1920 there were hauled more than 2,000,000 tons of iron ore over this road.

The electric power is taken from the water power plant at Porjus, Sweden. The length of the transmission line is about 200 km. (125 miles) and the voltage 30,000, the highest tension ever used in Norway. There are two substations along the road where the voltage is reduced to 16,000, which is used for the locomotives.

There will be required nine locomotives to replace the sixteen steam locomotives previously needed to take care of the traffic.

This is the fourth electric railroad in Norway. The last one was that between Kristiania and Drammen, completed in 1922, a distance of about 45 km. (28 miles).

Norway has no coal deposits but plenty of water power, about 14,000,000 hp., of which about 1,400,000 hp. is developed. The electrification of the towns and rural districts is rapidly progressing and it is only a question of time when all the railroads of the country will be electrified.

Financial and Corporate

Reorganization Reviewed

Total Capitalization of Successor to San Francisco-Oakland Terminal Railways Is $26,588,440

Under the plan of reorganization of the San Francisco-Oakland Terminal Railways, subject to the approval of the Railroad Commission, $15,125,000 of old common stock is wiped out, $13,050,000 of preferred stock is exchanged for $3,262,500 of new common, and the fixed charges heavily reduced by the substitution of preferred stocks for many of the old bond issues.

As noted previously in the ELECTRIC RAILWAY JOURNAL the properties of the railway were sold at foreclosure on July 17, 1923, to a committee of bondholders, thus giving effect to the plan of reorganization of this system dated July 7, 1922. The stock of the successor company will be placed in a voting trust for a period of seven years. During this time the board of directors is to consist of fifteen members, of whom four will represent the bondholders, eight the preferred stockholders and three the common stockholders.

The new company will be known as the Key System Transit Company. It will own the physical properties as well as all the stock of three subsidiary companies. Two of these subsidiary companies were formed in order to preserve, after the reorganization, the status of two of the old divisional mortgages; the third was formed to take care of the so-called "Halsey Notes."

CAPITALIZATION AND VALUE OF SAN FRANCISCO-OAKLAND TERMINAL PROPERTY

The capitalization of the new company will be as follows:

*Stocks—	Authorized	To be issued
7 per cent cum. prior preferred	$8.350,000	$6,000,000
7 per cent non-cum. preferred	6,100,000	3,800,000
Common	3,300,000	2,059,700
Bonds — (Parent Co.) —		
First mort. bonds, due 7-1-1938	10,000,000	2,500,000
Gen. and refund. 6s, 7-1-1938†	20,000,000	1,391,868
Gen. and refund. 5s, 7-1-1938†	20,000,000	7,871,871
Subsidiary Cos.—		
Oakland & Hayward R. Co. 6s, 1938	236,000	236,000
East Oak. Ry. Co. 6s, 1039	229,000	229,000
Oak Rail. ("Halsey Notes") 6s	2,500,000	2,500,000
Total capitalization		$26,588,440

(* Plus collateral on "Halsey Notes.")

(†This mortgage is virtually closed, as further bonds can only be issued to refund the first mortgage bonds or those of the subsidiary companies as listed in this table.)

In contrast with these figures the balance sheet of the company as of Dec. 31, 1921, showed among the liabilities stock to the amount of $28,175,000, long-term debt to the amount of $18,719,180 and current liabilities $8,114,054.

In a comprehensive review of the situation which it made the investment banking house of J. Barth & Company explains that to take care of the old securities on an equitable basis, they were divided into groups, and pending the issuance of the new securities, the old ones are traded in under the name of the group to which they belong. Coupons on the old bonds commencing with Jan. 1, 1920, having remained unpaid during the voluminous discussion preceding the settlement upon a plan of reorganization, it is now the intention to pay these back coupons in new securities at par. Thus, the principal and four years' interest of the old securities will be exchanged par for par for new securities.

The various groups into which the old securities are divided, and the treatment they will receive under the plan, are shown below:

Group 1-A (6 per cent)—Oakland-San Leandro & Haywards 1st 6s, 1922; Twenty-third Avenue Electric Railway 1st 6 per cent, 1923.

Each $1,000 bond of this group will be exchanged for $1,000 par value of the new divisional lien 6s, due 1938, known as Oakland & Hayward Railway Company 6s and East Oakland Railway Company 6s, respectively. The back interest on these two divisional liens will be paid in cash.

Group 1-B (6 per cent)—Oakland Transit Company 1st Cons. 6 per cent, 1918.

Each $1,000 bond of this issue will receive $1,240 par value of Key System Transit Company general and refunding mortgage 6s, due 1938.

Group 1-B (5 per cent)—Oakland Transit 1st Consolidated 5 per cent 1931; Oakland Transit Consolidated 1st consolidated 5 per cent 1932; San Francisco, Oakland & San Jose 1st 5 per cent 1933 ("Key Route 1sts"); East Shore & Suburban Railway Co. 1st 5 per cent 1940.

Each $1,000 bond of this group will receive $1,200 par value Key System Transit Company general and refunding mortgage 5s, due 1938.

Group 2 (5 per cent)—Oakland Traction Consolidated general consolidated 5 per cent 1933; San Francisco, Oakland & San Jose Railway 2d 5 per cent 1933 ("Key Route 2ds").

Each $1,000 bond of this group will receive nine shares Key System Transit Company 7 per cent cumulative preferred stock, three shares Key System Transit Company 7 per cent non-cumulative preferred stock.

Group 3 (5 per cent)—Oakland Traction Company general consolidated 5 per cent 1935; San Francisco, Oakland & San Jose consolidated railway, general consolidated 5 per cent ("Key Route 3ds").

Each $1,000 bond of this group will receive six shares Key System Transit Company 7 per cent cumulative preferred stock; six shares Key System Transit Company 7 per cent non-cumulative preferred stock.

Other securities—Oakland Railways Collateral Trust 6 per cent notes 1913 "Haisey notes").

Each $1,000 note will receive a $1,000 note of a subsidiary company formed for the purpose. These new notes will be dated July 1, 1923, due July 1, 1933, callable on any interest date at par and interest; guaranteed as to payment of interest by the Key System Transit Company, and secured by pledge in closed collateral trust of the following stocks for each $1,000 note; 6,512 shares Key System 7 per cent cumulative preferred; 6.512 shares Key System 7 per cent non-cumulative preferred; 4,811 shares Key System common.

The stocks thus to be held in trust will not bear dividends and are not included in the amounts to be issued.

San Francisco-Oakland Terminal Railways, A preferred: San Francisco-Oakland Terminal Railways, B preferred.

Each share will receive one-quarter share Key System Transit Company common.

San Francisco-Oakland Terminal Railways common.

This entire issue, 151.250 shares, will be wiped out.

The $2,500,000 of first mortgage bonds mentioned will be sold to provide funds to clean up the floating indebtedness of the old company, most of which was incurred to pay interest on the old bond issues prior to 1920; to retire equipment obligations by which the purchase of new cars and ferries has been temporarily financed; to pay the pro-rata of upset price to bondholders not participating in the plan and to meet all other necessary payments.

In considering the following estimate of earnings, it should be borne in mind that the interest charges shown include interest on the new first mortgage bonds, the proceeds of which are to be invested in the property and are expected to earn their interest by increasing the gross income and reducing operating expenses.

Estimates of earnings for 1923, applied to new capitalization, based on actual figures for first five months of 1923, and 1922 figures for last seven months are as follows:

1923—	Gross Rev.	Oper. Exp.	*Net Avail.
January	$596,490	$898,439	$106,792
February	547,738	365,724	98,033
March	662,373	402,336	129,052
April	611,847	406,476	108,578
May	621,519	394,592	127,053
1922—			
June	595,208	382,871	127,037
July	596,945	382,772	130,137
August	613,192	402,242	130,053
September	589,384	381,739	124,257
October	621,884	401,503	145,351
November	595,504	385,183	110,028
December	615,327	349,871	201,830
Totals	$7,267,425	$4,653,754	$1,538,207

* Net available for interest and dividends after all charges, including taxes and depreciation.

Estimated net earnings available for interest and dividends		$1,538.207
Annual interest new bonds...	$650,000	
An. int. "Halsey Notes"	150,000	800.000
		$738,207
Annual dividends on cumulative preferred ($6,000,000 at 7%)		420,000
Annual dividends on non-cumulative preferred ($3,800,000 at 7%)		266,000
Estimated surplus after meeting full dividend requirement on both classes of preferred stock		$52,207

Actual figures first five months of 1922, for comparison:

1922			
January	$562,974	$390,854	$85,421
February	500,915	353,615	47,763
March	578,022	402,780	97,364
April	597,062	380,216	123,251
May	600,214	398,522	114,618
Year 1922	7,075,537	4,612,081	1,437,115

Approval of Securities of Successor to Michigan United Sought

Approval is being sought from the State Public Utilities Commission of Michigan of the securities intended to be issued under the plan for the reorganization of the Michigan United Railways as the Michigan Electric Company. The successor company desires to issue $6,500,000 property purchase first mortgage bonds, $6,300,000 of 5 per cent cumulative stock, $1,603,000 of 5 per cent non-cumulative preferred stock and $98,750 of common stock of no par value. To obtain working capital, the company has asked for a right to sell $600,000 of first mortgage bonds and 1,250 shares of common stock at not less than $20 a share. The date for the hearing has been fixed for Aug. 30.

Interurban Seeks to Purchase Kansas City-Outer Belt Property

The Kansas City, Kaw Valley & Western Railway, Kansas City, Kan., has applied to the Interstate Commerce Commission for authority to buy from Emil Metscham, Kansas City, Mo., the property of the Kansas City-Outer Belt Electric Railroad, purchased by him under foreclosure sale. The Kansas City, Kaw Valley & Western Company operates an electric interurban road between Kansas City and Lawrence, Kan., and now seeks to secure a right to use a part of the Outer Belt trackage for the purpose of entering Kansas City, Kan., and Kansas City, Mo.

The interurban company has agreed to purchase from Mr. Metscham the first mortgage bonds, amounting to $379,000, and preferred stock in the sum of $481,000 and common stock to the amount of $962,000 to be issued to him by the Kansas & Missouri Railway & Terminal Company. The Kansas City Southern has agreed to purchase from the applicant one-half of these stocks and bonds for the purpose of securing joint and equal control of the carrier. The point is made in the application that the combined strength of the two companies is necessary to finance the property properly.

The Kansas City-Outer Belt Line was conceived by Arthur E. Stillwell about twenty years ago. The project he had in mind was an ambitious one for encircling the twin cities in Missouri and Kansas by an electric belt line. Seven miles of the line was graded and some rail laid, but the program was never carried to conclusion. Much real estate intended for switching and terminal purposes was bought. In all $2,500,000 was spent. Latterly J. J. Heim and his associates in the Kansas City, Kaw Valley & Western have become interested in the proposal. A map of the route of the road and a statement regarding the plans of Mr. Heim were published in the ELECTRIC RAILWAY JOURNAL for Aug. 5, 1922, page 208.

Negotiations looking toward the carrying out of Mr. Heim's ideas with respect to the road have been under way since then.

Saginaw Property Sold

Another step toward the resumption of electric railway service in Saginaw has been taken in the sale of the Saginaw Bay City Railway property in Saginaw and Bay City in the Federal bankrupcy court. George E. Wedthoff, representing the Northern Title & Trust Company, Bay City, bid in the property at the sale on Aug. 18 for $225,000. He was the only bidder and deposited $12,000 as a guarantee of good faith with the referee who conducted the sale. Under the terms of the order made by the referee on petition of the trustee, Otto Schupp, this leaves the property free and clear of all mortgages.

The Northern Title & Trust Company will hold the property until the formal organization of the Saginaw Transit Company, which is to operate the property under the street car-bus franchise granted at the special election on June 25.

At present a temporary organization is functioning and will act at the hearing before the State Public Utilities Commission on Aug. 30, when the commission will consider the petition for financing and the right to file the articles of association with the Secretary of State.

Auction Sales in New York.—At the public auction rooms of A. H. Muller & Sons there were no sales of electric railway securities this week.

Small Loss at Albany for Quarter.—The first three months of 1923 netted the United Traction Company a loss of $41,472, according to the company's report covering the first quarter. The same period of 1922 showed a gain of $7,968. Operating expenses increased $67,568. The net revenue for the first quarter of 1923 was $124,987, compared with $170,627 for the first quarter of 1922. Revenues from other sources brought the gross income for the two periods to $138,337 and $185,348, respectively. Fixed charges totaling $179,809 caused the loss of $41,704. The first quarter of 1923 showed 10,991,873 passengers carried, compared with 11,022,749 in the first quarter of 1922.

Mr. Mitchell Elected to New Orleans Board.—S. Z. Mitchell, president of the Electric Bond & Share Company, New York, has been elected a director of the New Orleans Public Service, Inc. He will represent the purchasers of the bonds of the New Orleans Public Service, Inc., and, with G. M. Dahl, is the only other member of the directorate from New York City.

Receiver Appointed for Illinois Line.—R. H. Hayward, general manager of the Galesburg & Kewanee Electric Railway, operating the city lines in Kewanee, Ill., and the interurban service between Kewanee and Galva, has been appointed receiver for the company in the Circuit Court at Cambridge by Judge C. J. Searle. The appointment was made in response to an application by the bondholders' committee.

Cities Service Earnings Are Improving.—The Cities Service Company earnings statement for the twelve months ended July 31, 1923, shows improvement over the corresponding twelve months of the preceding year, as well as a gain over the month of June. Gross earnings in the twelve months period totaled $16,523,677, as compared with $13,844,852 in the preceding year. Net earnings were $16,009,628, as compared with $13,402,254, and net to stock was $13,394,999, as compared with $11,236,187. Preferred dividends were earned 2.70 times as compared with 2.29 times in the preceding year, and after the payment of preferred dividends, net available for common stock was equivalent to $18.13 a share. This compared with $13.63 a share earned on the common stock in the twelve months ended July 31, 1922. Gross earnings in July were $1,296,673, as compared with $1,060,862 in July, 1922. Net to stock increased to $1,031,829 from $832,326, while net to common stock and reserves in the month increased to $615,956 from $422,488.

Conspectus of Indexes for Aug., 1923

Compiled for Publication in this Paper by

Albert S. Richey
Electric Railway Engineer
Worcester, Mass.

	Latest	Month Ago	Year Ago	Since War	
				High	Low
Street Railway Fares* 1913 = 4.84	Aug. 1923 **6.92**	July 1923 **6.92**	Aug. 1922 **7.01**	May 1921 **7.24**	May 1923 **6.88**
Street Railway Materials* 1913 = 100	July 1923 **169**	June 1923 **171**	July 1922 **181**	Sept. 1920 **247**	Sept. 1921 **156**
Street Railway Wages 1913 = 100	Aug. 1923 **214**	July 1923 **212**	Aug. 1922 **208**	Sept. 1920 **232**	Apr 1923 **207**
Steel—Unfilled Orders (Million Tons) 1913 = 5.91	July 31 1923 **5.91**	June 30 1923 **6.39**	July 31 1922 **5.78**	July 31 1920 **11.12**	Feb. 28 1922 **4.14**
U.S. Bank Clearings Outside N. Y. City (Billions)	July 1923 **14.69**	June 1923 **15.38**	July 1922 **12.87**	Mar. 1920 **18.54**	Feb. 1922 **10.65**
Business Failures	July 1923	June 1923	July 1922	Jan. 1922	May 1923
Number	**1,406**	**1,378**	**1,575**	**2,722**	**1,467**
Liabilities (millions)	**36.58**	**52.00**	**43.12**	**185.7**	**31.77**

	Latest	Month Ago	Year Ago	Since War	
				High	Low
Eng. News-Record Construction costs 1913 = 100	Aug. 1923 **221.5**	July 1923 **222.1**	Aug. 1922 **173.4**	June 1920 **273.8**	Mar. 1922 **162.0**
U.S. Bur. Lab. Stat. Wholesale Commodities 1913 = 100	July 1923 **151**	June 1923 **153**	July 1922 **155**	May 1920 **247**	Jan. 1922 **138**
Bradstreet's Wholesale Commodities 1913=9.21	Aug. 1 1923 **12.82**	July 1 1923 **13.09**	Aug. 1 1922 **12.07**	Feb. 1 1920 **20.87**	June 1 1921 **10.62**
Dun's—Wholesale Commodities 1913 = 120.9	Aug. 1 1923 **186.7**	July 1 1923 **183.7**	Aug. 1 1922 **173.6**	May 1 1920 **263.3**	July 1 1921 **159.8**
U.S. Bur. Lab. Stat. Retail food 1913 = 100	July 1923 **147**	June 1923 **144**	July 1922 **142**	June 1920 **219**	Mar. 1922 **139**
Nat. Ind. Conf. Bd. Cost of living 1914 = 100	July 1923 **161.9**	June 1923 **160.1**	July 1922 **155.6**	July 1920 **204.5**	Aug. 1922 **154.5**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population.

Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen and conductors on 105 street and interurban railways in the United States, operating more than 100 passenger cars each, and weighted according to number of cars.

Traffic and Transportation

Fares Increased in Detroit

Municipal Railway to Advance Cash Fare on Sept. 2 from 5 Cents to 6 Cents

Detroit's municipal railway is going to increase its fares. The advance is to be from 5 cents to 6 cents. Tickets will be sold nine for 50 cents. The charge for transfer will remain at 1 cent. The new rate will be effective from Sept. 2. Announcement to this effect was made on Aug. 21. The decision to advance fares was reached following the announcement of a wage increase to the men by the arbitration board, referred to elsewhere in this issue.

The decision regarding fares was in fact arrived at by the Street Railway Commission at a meeting on the afternoon of Aug. 21, two days after the wage award was filed, but announcement was not made until late on Aug. 21 by Ross Schram, assistant general manager of the lines, who communicated to John J. Barlum and G. Ogden Ellis, two of the three commissioners, the fact that Mayor Doremus had been consulted Monday night and had declared that he would accept the recommendation of the commission for the 6-cent fare.

The statement issued by the Street Railway Commission follows:

> The award of an increased wage to the platform employees, effective Aug. 18, 1923, will increase the monthly expense of the department of street railways approximately $50,000. In addition, the retroactive feature of the award, which goes back to June 1, 1923, will cause the department an additional expense of $50,000 per month for three months. This additional monthly expense confronting the department is, of course, in excess of its present income.
>
> Therefore section 14 of the street railway chapter of the city charter obligates the board of street railway commissioners to increase the rates of fare.
>
> Section 14 of the street railways chapter of the city charter reads as follows:
>
> "The rate of fare on said street railway system shall be sufficient to pay, and the said board shall cause to be paid:
>
> "(a) Operating and maintenance expenses, including paving and watering between the tracks;
>
> "(b) Taxes on the physical property of the entire street car system, the same as though privately owned;
>
> "(c) Fixed charges;
>
> "(d) A sufficient per cent per annum to provide a sinking fund to pay the principal of the mortgage bonds issued at their maturity and such other additional per cent per annum to provide, in the sound discretion of the board, a sinking fund to pay the principal of the general bonds issued as soon as practicable, to the end that the entire cost of said street railway system shall be paid eventually out of the earnings thereof."
>
> Therefore, effective Sunday, Sept. 2, 1923, the fare rates will be revised. Tickets will be sold in strips of nine at 50 cents; single cash fares will be at the rate of 6 cents each; transfers will be charged for at the rate of 1 cent each. This new fare plan is required to meet the present contingency as well as the increased power costs effective under the new power contract on July 1, 1923.

In explaining the decision to increase fares, Mr. Schram said that the wage increase will add annually approximately $700,000 to the railway expenses, and with increased power costs in the next year of approximately $200,000, the surplus of $938,000 which has been built up in the last twelve months will be wiped out. He was quoted as follows:

> With the increased operating costs offsetting the surplus we have been able to build up, there will be nothing left for higher wages for other employees, which will have to be granted as a result of the increase to platform men, and for rehabilitation of the lines and extension.
>
> To provide funds for these items, it was the decision of the commission that the fares would have to be raised. The increase from 5 to 6 cents will provide approximately $2,000,000 more in revenue annually, we have estimated, and this will permit of expenditures of approximately $1,750,000 annually for new cars, other rehabilitation expenses, and for extensions if moneys for that purpose are not available from the sale of bonds, which the comptroller has held up.

Mr. Schram further called attention to the fact that even with the increase in fares which will go into effect on Sept. 2 the rate in Detroit will be lower than in most other cities. He quoted the figure of 7.08 as the average.

Circuit Judge Harry J. Dingeman, who was the chairman of the board of arbitration in the wage dispute, is reported to have expressed surprise at the decision of the Street Railway Commission to increase fares. He is quoted as having said:

> We carefully considered the possibility of an increase in fares resulting from an increase in the wages of the men. After analyzing the figures presented to us, it was the belief of myself and my colleagues in the arbitration that the higher wages granted the men would not necessitate any increase in fares.

Voluntary 6-Cent Fare Asked in Akron

The actual cost of producing a ride on the lines of the Northern Ohio Traction & Light Company in the city of Akron is 5.7 cents. This figure does not include interest on the investment, nor depreciation. It includes only wages, taxes, power and upkeep. On the basis of these figures the company has appealed to the public voluntarily to pay a 6-cent fare. It is not compulsory. The franchise provides only a 5-cent fare. The operating grant of the company expires next February.

The company has explained all these facts to its employees. In concluding a statement in which they are set forth the company says:

"If asked about these points please explain to car riders.

"If 6 cents is tendered as fare, please accept, but please do not request passengers to pay 6 cents.

"We hope they will do it voluntarily. When passengers pay 6 cents, please thank them.

"You can materially assist your company in this movement by courtesy at all times."

Wage Increase a Problem

Cincinnati Traction Will Practice Extreme Economies in Effort to Avoid Fare Increase

Introduction of one-man cars on lines other than those on which they are now operated has been announced by W. Kesley Schoepf, president of the Cincinnati Traction Company, as a measure toward reducing operating expenses and to forestall an increase in fares. This movement, according to Mr. Schoepf, is in line with the company's policy eventually to equip practically all its lines with one-man cars. At the present time the company operates the new type cars on two of its lines. The system comprises approximately forty-two routes, so that it will be some time before the company can replace any very considerable number of the present two-man cars with one-man cars.

Mr. Schoepf said that drastic measures would have to be taken to reduce expenditures in order to keep the rate of fare at 7½ cents. He emphasized the fact that the award of the arbitrators granting the company's many employees increases in wages ranging from 3 to 7 cents an hour would result in additional charges of approximately $250,000 a year. Under the terms of the service-at-cost franchise the company is empowered to raise its fare when a deficit is shown in the operating expenses for two consecutive months. The effort of the company will be to keep the present standard of service at the new wage scale without increasing fares.

As the arbitrators' wage agreement is retroactive to July 1, Mr. Schoepf explained that the operating expenses of the company for the months of July and August would show a substantial deficit.

In commenting on the situation, Mr. Schoepf said:

> The wage award is retroactive to July 1. It has been impossible as yet to complete the computation of wages due at the new and higher rate for the month of July. It is, therefore, impossible to determine the actual results of operation for that month, although it is certain that the increase in wages will result in a substantial operating deficit. As an increase in the rate of fare can result only after a deficit for two months, the months of July and August will have to be taken together in governing whether there will be an increase in the rate of fare on Oct. 1.
>
> It is desirable that an increase in the rate of fare be avoided if possible. It will be very difficult, however, to prevent an increase, because of the burdensome increase in the payroll imposed by the arbitrators, which later computations show will be approximately $300,000 a year. In the arbitration proceedings the officers of this company pointed out that a total increase of $100,000 or even $150,000 a year might possibly have been overcome by the practice of super-rigid economy, but with an increase of double that amount, I cannot at this time give any hope that an increase in fare can be avoided.
>
> The month between now and Sept. 15, when the announcement of an increase in the rate of fare, effective Oct. 1, would be made, will afford an opportunity to determine if reductions and economies can be brought about sufficient to accomplish the desired end.
>
> One of the measures to be taken will be the introduction of one-man cars on other lines than those on which they are now operated. The first line to which their operation will be extended will be the East End line.
>
> While the award of the arbitrators of a

premium of 7 cents an hour to one-man car operators is in excess of the premium paid in other cities and, therefore, an added burden for the car-riding public to bear, it is believed that this premium will tend to popularize one-man cars with the employees, as they are already popular with the riding public.

Jitneys Still Operating in Schenectady

At Schenectady the jitney situation remains unchanged so far as operation is concerned. The Schenectady Railway has as yet made no effort to serve contempt papers on the operators.

The next move in the legal battle will probably be made on Aug. 25 at Canton, St. Lawrence County, where the order will be argued, to show cause why the temporary injunction of Justice Angell restraining jitney operation should not be made permanent.

Attorneys for the jitney operators will take appeals as soon as decisions are rendered against them and papers have been served. An appeal has already been filed from the order of Justice Borst setting aside the order of County Judge McMullen, which order set aside the original order restraining the operation of jitneys in Schenectady. The legal tangle is rapidly assuming the aspect of the "house that jack built."

Northern Ohio Takes Progressive Stand on Use of Bus

"Just remember one thing: this company—the Northern Ohio Traction & Light—is in the transportation business!

"When the horse cars gave way to the electric cars this company changed over to electric motive power. When the electric car gives way to the bus, if it does, this company will still be in the transportation business, operating buses!"

The speaker was A. C. Blinn, vice-president and general manager of the Northern Ohio Traction & Light Company, Akron. He was discussing the possibility of buses being substituted for electric cars in the future.

At a meeting of citizens on West Hill recently at which the question of the removal of car tracks from West Market Street was discussed, Mr. Blinn practically repeated this statement. He said at that time:

> If the time has arrived when buses should supplant the street cars, then this company is ready and willing to change. I hardly believe the time has come. I believe it would be difficult to handle the people with buses. However, we want to do what you want done. We want to furnish the kind of transportation you want!

In commenting on these statements in the August issue of the *Northern Light*, published for and by the employees of the Northern Ohio Traction & Light Company, the company said that it desired to drive Mr. Blinn's remarks home to every employee. The statement then continued in part:

> The point we are trying to make is this: The investments made by this company are not going to be scrapped. We are not going to take the stockholders' money and throw it away. It is invested so that we can assure him or her the return pledged. There are not going to be a lot of losses in investments made in developing this transportation system.
>
> Back thirty or more years ago, when street car lines were operated with horses or mules, a transportation company was organized to handle the business in every city where they were operated. These companies, when the cable car came along and it looked like that was to be the method of transportation, changed to cable cars. Then came the electric cars, and the same companies, still continuing to do business, adopted the electric car as the method of transportation.
>
> "We judge the future by the past" is an old saying. It holds good with reference to the companies in the transportation business. It is perfectly consistent that the recognized transportation company should continue in the business and adopt whatever method of travel the people who ride desire, when that method meets the universal needs of the people as a whole.
>
> Transportation is our business—and we are going to stick to it!

Pass Popular in Paducah

Approximately 775 weekly passes are being sold each week by the Paducah Railway, Paducah, Ky. It was just a year ago that the pass was introduced there. To be exact the date was Aug. 28, 1922. Its coming was heralded by an advertising campaign in the local newspaper. Six hundred and thirty-seven passes were sold the first week. Since the pass was first placed on sale in Paducah, the original advertising has been followed up by a weekly reminder, in the local newspapers, calling attention to its economical and trouble saving features. The railway considers this money well spent. In commenting in the *Paducah Electric News* on the results secured the company says:

> The weekly pass is deservedly popular. It has many features which commend it to the riding public. Designed as a wholesale rate, it extends the privilege of unlimited riding for a period of seven days. It is transferable. It does away with the necessity of searching for the correct change, or obtaining transfers. The only formality is the showing of the weekly pass to the operator.
>
> Many of the patrons of the Paducah Railway are making use of this economical wholesale rate, and thus set their own fares per single ride. More are joining this group every week. The Paducah Railway is confident that the sales of the weekly pass will continue to increase as rapidly in the future as they have in the past.

Transportation Survey Planned at Indianapolis

J. Rowland Bibbins has been retained by the City Planning Commission of Indianapolis to advise its transportation committee on the general transportation plan of Indianapolis for both present and future. L. W. Bruck, of the Insley Manufacturing Company, Indianapolis, is chairman of this committee.

A preliminary survey will be made at once for the purpose of directing the further work of the commission in developing the transportation features of the city plan. This work will include the study of the needs and the future development of transit, traffic, thoroughfares, railroads, terminals, motor transport and the special needs of the various commercial, industrial and residential districts with the object of obtaining a well rounded transportation plan best adapted to the needs of all the conflicting interests and for the guidance of the community in its future development.

Commission Has Say on One-Man Cars in Buffalo

The Corporation Counsel of the city of Buffalo has advised Mayor Frank X. Schwab that the city is powerless to prevent the operation of one-man cars on the local lines of the International Railway. Mayor Schwab recently wrote the company threatening court action unless the use of one-man cars was discontinued. The railway ignored the letter.

In his decision, the Corporation Counsel calls attention to the fact that the city of Schenectady adopted an ordinance requiring a motorman and conductor on each local car. In a test of that measure the State Supreme Court ruled that a municipality is without power to enforce such a measure and that the matter is one for the Public Service Commission to determine. It is also pointed out that in the case of the New York State Railways the Public Service Commission ruled that one man is sufficient for a double-truck car, provided the car is equipped with all modern safety devices.

Use of One-Man Cars by Ohio Interurban Sustained

The one-man car system used by the Cincinnati, Georgetown & Portsmouth Railway is safe and affords the public a modern means of transportation. This in effect is the ruling made recently by the Ohio State Public Utilities Commission. The commission dismissed the complaint of Julius Luchsinger, president of the trolley men's union, who sought an order directing the interurban to stop using the cars. The company operates one-man cars exclusively on its lines between Cincinnati and Russelville, Ohio.

Evidence in the case was heard by the commission at Columbus on June 5. The company contended that in order to curtail expenses and furnish better service it adopted the one-man car and started hourly service. Before that service was given every two hours. The union contended that the one-man operation was dangerous.

International Creates Bus Subsidiary

The International Railway, Buffalo, N. Y., recently received a permit from the Public Service Commission for the operation of buses on Bailey Avenue between Broadway and the north city line in conformity with operating rights granted by the City Council.

Coincident with the securing of the right to operate from the Public Service Commission, the company organized the International Bus Corporation with an authorized capitalization of $100,000. The incorporators are: H. L. Mack, Herbert G. Tulley, R. Harland Horton, C. A. Weber and C. A. Cheval.

The International had planned to lay tracks on Bailey Avenue, but lately abandoned the idea and allowed its franchise to lapse.

Personal Items

G. H. Wilmarth Made Manager

Northern States Power Official Advances to Post with Properties Purchased Recently

R. F. Pack, vice-president and general manager of the Northern States Power Company, has announced the appointment of George H. Wilmarth as manager of the Wisconsin-Minnesota Light & Power Company, with headquarters at Eau Claire. The Wisconsin-Minnesota Light & Power Company was recently made part of the Northern States Power system.

Mr. Wilmarth has been connected with the public utility industry since 1899, when he received his degree in electrical engineering at the University of Illinois. His experience since that time ranges from construction activities in the telephone and traction fields, notably the Chicago Electric Traction, Illinois Traction and Canton-Akron line, to the management of electric and gas companies.

G. H. Wilmarth

Mr. Wilmarth's affiliation with the Byllesby organization began as general superintendent of the Red River Power Company at Grand Forks, N. D., now part of the Northern States Power system. He served in that capacity from 1910 to 1912, and then was transferred to Sapulpa, Okla., as manager. In 1918 he became manager of the Muskogee division of the Oklahoma Gas & Electric Company, from which position he has resigned to go to Eau Claire.

Safety Director Named

E. K. Eastham has been appointed safety director of the United Railways, St. Louis, by Col. A. T. Perkins, manager for the receiver. He has entered upon his duties. It is a newly created office that he will fill.

Mr. Eastham's first work with the company at St. Louis will be to carry out a vigorous safety campaign outlined for him by Colonel Perkins. One of the features of this work will probably be the revival of car folders and the use of more advertising.

In the course of his first plea to 6,000 employees to co-operate in an intensified safety campaign, Mr. Eastham said:

> As you know, accidents are costing the company lots of money—more than $1,000,000 in 1922. Moreover, there is heavy cost in pain and tears which cannot well be measured in money terms. So this is quite a large job Colonel Perkins has handed to me; entirely too big for one man, or two or a dozen, but not too big, I am sure, for you and me and all pulling together.

Besides the three prizes of $100 each awarded to car stations showing the greatest reduction in the number of boarding and alighting accidents, other transportation accidents, and no report claims, respectively, a prize of $10 is to be awarded each month to the motorman or conductor sending in the best suggestion, and the response in a few days has brought a large number of meaty suggestions.

Closer co-operation with the Safety Council and the city authorities will be a feature of the campaign.

Mr. Eastham was born and reared in Catlettsburg, Ky. He has lived in the far South since 1905, serving most of the time in various steam railway capacities, principally in claims divisions.

Dr. Addison Retires

Dr. Thomas Addison, often called the father of the electrical industry in the West, has retired at his own request as Pacific Coast manager of the General Electric Company. He will be succeeded by J. A. Cranston, formerly Northwestern manager.

Dr. Addison has been with the company for thirty-three years, and has held his present position since 1892. He was born in Courtland, Mich., and was graduated from Bellevue Medical College with the class of 1877. He forsook his profession in 1885 to take employment with the United States Electrical Company, Chicago, and in 1888 he accepted a position as apparatus salesman with the Thomson-Houston Company at that city. When the Western branch of the company was reorganized in 1890 he was selected to go to San Francisco as local manager. Two years later he became Pacific Coast manager of the company.

Dr. Addison's great contribution to electrical progress has not been confined to the advancement of his own company. He has taken an active part in the upbuilding of other branches of the industry besides his own and has shown a warm interest in the formation of local technical and commercial organizations and their development to their present importance.

New San Diego Official

Superintendent of Equipment There Is Man of Wide Technical Attainments and Practical Experience

S. E. Mason, recently appointed superintendent of equipment of the San Diego Electric Railway, has been doing electrical work of one kind or another practically all his life. The extent to which this is true is shown by the fact that he paid his way through college by erecting three small electric plants for three municipalities in his native state.

Mr. Mason was born in Texas in 1889. After working himself up to be manager of the electric plant at Honey Grove by his own efforts, he entered the University of Texas and graduated in 1911 with the degree of electrical engineer. Upon graduation, he entered the employ of the San Antonio Gas & Electric company, and for that company and the Bureau of Standards he made an extensive electrolytical survey of San Antonio in 1912. He then entered the employ of the San Antonio Public Service Company, and in the years from 1914 to 1918 supervised the reconstruction of about 50 miles of track in San Antonio. He then became superintendent of equipment for the San Antonio company, which position he relinquished to become connected with the San Diego Electric Railway.

S. E. Mason

As superintendent of equipment for the San Diego company, Mr. Mason has charge of all the railway company's equipment, and also the way and structures and the bonding and welding departments. The position is a new one, created by dividing duties formerly performed by other officials.

D. H. Foote, formerly secretary and assistant treasurer of the Pacific Gas & Electric Company, Sacramento, Calif., has assumed the title of third vice-president and secretary.

R. L. Smith has succeeded Henry H. Lynch as chief engineer and engineer maintenance of way of the Peninsular Railway, San José, Calif. Mr. Lynch will continue in that capacity for the San José Railroads.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Living Conditions in the West Virginia Coal Fields

Peace will never be permanently assured in the mine fields of West Virginia until the public mind is disabused of years of propaganda by which the United Mine Workers of America have sought to excuse periodic violent and bloody attempts to organize the state, according to a brief filed Aug. 18 with the United States Coal Commission by counsel for the Bituminous Operators' Special Committee. The members of the commission are urged to visit the West Virginia mining regions in person.

The following are the facts as to living conditions and wages as summarized in the brief:

The eight-hour day is universal among the non-union miners.

The earnings of non-union miners range far in advance of farm laborers and other unskilled workers.

The earnings of miners in non-union fields are at least as high as those in union fields. In 1920, in a substantial number of mines in the non-union fields, 29 per cent of the machine miners, pick miners and loaders who worked 100 days or more earned over $2,500. In 1920 and 1921 a few such miners earned more than $4,000.

The miner is more nearly his own boss as to whether he will work when the mine is running, how long he will work and how he will work than almost any other class of laborer.

The housing and living conditions of the miners are those of a progressive industrial community and compare favorably with mine communities the country over in union and non-union fields.

Finally, the miners of southern West Virginia, far from being held in subjection and kept from unionization by force of arms, have themselves taken up arms to resist forcible attempts to impose unionization upon them.

Of twelve average communities in the Mingo County field, the brief relates, ten had piped water systems; five had partial or complete piped sewage systems and ten had regular garbage collection. Three had company doctors devoting their entire time to employees and nine had from one to three contract doctors; four conducted some form of welfare work for the benefit of their employees. Eleven had schools for white children in or adjacent to the communities, the twelfth using the town school 1 mile distant. Of these there were six schools, where, by supplementing the teachers' salaries, the school term was made longer than the county provided. Five towns had separate schools for colored children. All either owned church buildings or utilized the schoolhouse for religious services.

Houses in the field generally are equipped with electricity, and miners' wives in the community were found using such conveniences as electric washing machines, iron, fans, toasters and ranges, generally without any charge beyond the small flat rate charged per lamp. The living conditions illustrated by these facts were superior to those found in the non-company owned towns.

A Railway that Thought It Saved by Building Its Special Work

A few railway companies build their own special trackwork, usually with the idea in mind that they save money by so doing. This has always been a doubtful economy for it seems highly probable that the manufacturer whose sole business is to make special trackwork would not only produce a better product but could do it more economically, when having an organization experienced and constantly engaged in this kind of work as a specialty. Information comes to hand that one such railway company thought it was saving about 40 per cent by building its own trackwork. This saving was arrived at by comparing the labor payroll plus the material cost with the cost supplied by manufacturers. No overhead expense was included, not even engineering supervision.

Substitutes for Anthracite

Spokesmen for the administration at Washington have let it be known that plans have been perfected to forward heavy shipments of substitutes for hard coal — bituminous coal and coke — into the anthracite-consuming sections should a cessation of operations in the collieries come September 1, or at any date. It is realized that to provide substitutes will entail longer railroad hauls in many cases, place a strain upon open-top car supply and create other problems, yet the plan, it is felt, will insure the people and the industries of the anthracite-consuming regions against suffering from cold or a shutdown of plants.

The Federal fuel distributor, F. R. Wadleigh, will be placed in charge of distribution of substitutes if production of anthracite ceases. The broad powers of the Interstate Commerce Commission will be employed to execute the plan. Mr. Wadleigh's office as Federal fuel distributor expires by limitation Sept. 22, but he can be appointed an agent by the Interstate Commerce Commission, and this will probably be done if the necessity arises.

The National Coal Association, through its president, J. C. Bryden, speaking for the bituminous operators, has offered a plan to the government of supplying soft coal to the anthracite-consuming areas, with voluntary committees of operators to assist and with traffic experts to aid the distribution, while at the same time agreeing in advance to submit to voluntary price regulation or supervision by the Federal government. It is highly probable that the offer of the bituminous operators will be accepted, should occasion arise, at least in major part.

British Railway Electrification

Contracts are now being let for the conversion to electric traction of all suburban lines of the Southeastern section of the Southern Railway, within a radius of 15 miles of Charing Cross. There is a pre-war obligation on the part of the London, Midland & Scottish Railway to electrify their lines from London to South End, a distance of about 40 miles. The exact date when this will be done, however, is not known.

All four of the railway companies mentioned above are now spending large sums of money in development work. It is said that the work planned will cost about £8,000,000. Except in the case of the Southern Railway, however, these developments have nothing to do with electrification.

In this connection interesting suggestions have been made with a view to relieving unemployment by advocating the electrification of steam railways. The following schemes are specifically suggested:

1. The extension and electrification of the London & Southern section of the Southern Railway.
2. The completion of suburban electrification of the London, Brighton & South Coast section of the Southern Railway, and the electrification of the main line as far as Brighton.
3. The suburban electrification of the Great Eastern section of the London & North Eastern Railway.
4. The electrification of the main line of the London & North Eastern Railway from York to New Castle.
5. The electrification of the line of the London, Midland & Scottish Railway from London to Tilbury and South End.

Metal, Coal and Material Prices

Metals—New York	Aug. 21, 1923
Copper, electrolytic, cents per lb	13.75
Copper wire base, cents per lb	16 75
Lead, cents per lb	6 55
Zinc, cents per lb	6.45
Tin, Straits, cents per lb	39.50
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$5.325
Somerset mine run, Boston, net tons	$2 625
Pittsburgh mine run, Pittsburgh, net tons	$2.075
Franklin, Ill., screenings, Chicago, net tons	1.675
Central, Ill., screenings, Chicago, net tons	1.375
Kansas screenings, Kansas City, net tons	2.625
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	$7.00
Weatherproof wire base, N. Y., cents per lb.	18 75
Cement, Chicago net prices, without bags	$2 20
Linseed oil (5-bbl. lots), N. Y., per gal	$0.965
White lead, in oil (100-lb. keg), N. Y., cents per lb	11.375
Turpentine, (bbl. lots), N.Y., per gal	$0.96

Mechanical Snow Handling

An unusually attractive booklet has been prepared by the Barber-Greene Company, Aurora, Ill., to advertise its snowfighting equipment. The popular impression that the average snowfall is decreasing from year to year and that the present winters are less severe than the winters of years gone by is contradicted by the snowfall figures given in the booklet. The dangers incident to allowing snow to remain in the streets are also clearly pointed out. The booklet then goes on to tell of the success of the mechanical snow loader. Many electric railways are listed among those using this apparatus, and examples and pictures showing the loader at work in various cities are included.

Track and Line

Los Angeles Railway is installing new special work at Pico and Grand Avenue. On Larchmont between Beverly Boulevard and Melrose the track is being lowered preparatory to paving the intersections.

Toronto Transportation Commission has announced plans for the extension of its car lines. The proposed route would run along Oakwood Avenue, Rogers and Hillary Avenues to the Weston Road, ending in a loop.

Knoxville Power & Light Company, Knoxville, Tenn., has been granted permission to establish a switch at the corner of Gay Street and Clinch Avenue. The cost of the improvement is estimated at $4,000.

Rockford & Interurban Railway, Rockford, Ill., and the Beloit Traction Company will lay double track in the city of Beloit, Wis., in accordance with the city street improvement program.

Detroit Municipal Railway Department's needs for special trackwork at intersections and for rail replacements were placed at $750,000 by Philip A. Kerwin, superintendent of tracks of the railway, testifying in the recent wage arbitration case. He said that many miles of the lines taken over by the city from the Detroit United Railway are so badly in need of foundations, new rails and repairs as not to be safe to operate.

New Orleans, La.—An ordinance has been introduced by Commissioner Maloney of the Department of Public Utilities providing for the extension of the North Claiborne Street line from its present terminus at Frenchmen Street to Florida Walk on the upper side of Elysian Fields Street. This action was taken as the result of a compromise effected by the city, the Louisville & Nashville Railroad, and the property holders and residents along Elysian Fields Street, who opposed the recommendation contained in the Beeler report, on reorganization, suggesting that Elysian Fields Street be widened 6 ft. and that a belt line be constructed on each side of the area now in use by the Louisville & Nashville Railroad, from Royal Street to Florida Walk.

Power Houses, Shops and Buildings

Trenton & Mercer County Traction Corporation, Trenton, N. J., has been granted permission by the Trenton City Commission to establish a terminal on Perry Street, Trenton. The proposed terminal will cost approximately $250,000. Part of the ground will also be used for car shop purposes.

Louisville Railway, through Vice-President Sam Riddle, has stated that the date is uncertain when new estimates would be obtained on the construction cost of the proposed new interurban terminus and railway office building at Second and Liberty Streets. The postponement of this project was recently announced. Original estimates aggregated more than $1,250,000. He said that now that the company had decided not to build for the time being he was unable to give out any time at all when the contemplated plans might be started.

Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., following a decision a few days ago dissolving a temporary court order restraining it from entering the electric power field in Indianapolis, is going ahead with plans for the production of electric power on a very large scale. Its program, according to Robert I. Todd, president, calls for an expenditure of approximately $7,000,000 for construction work. This work includes the erection of a super-power generating station, probably on a site adjacent to its present central station, and the construction of high-tension transmission lines across the entire state, the length of its interurban property.

Trade Notes

Diamond Power Specialty Corporation, Detroit, has announced the appointment of Paul E. Theis as sales manager of the Cleveland district with offices at 608 Rockefeller Building.

Portland Cement Association, Chicago, announces the appointment of J. M. Marshall as district engineer of the association office at Atlanta. He succeeds Walter B. Elcock, recently promoted to assistant general manager in charge of the southeastern offices.

Laurence E. Morier has returned to the pole industry as Eastern sales manager for Page & Hill Company, Minneapolis. His headquarters are at 855 Reibold Building, Dayton, Ohio. In this addition to its staff, Page & Hill Company brings about a closer personal contact with its customers through the medium of a representative of long practical experience and wide acquaintance.

Charles H. Ensign, a well known construction engineer of Cleveland, Ohio, and Mark G. Snow, recently engineer of roadway, track and bridge costs with the Froehlich & Emery Engineering Company, Toledo, Ohio, and Detroit, Mich., on the appraisal of the interurban railways of Michigan for the Public Utilities Commission of that State, have established offices at 517 National City Bank Building, Cleveland, for the general practice of civil, architectural and appraisal engineering with special attention to investigations, reports, designs, estimates, supervision and construction problems under the name of Ensign & Snow, Engineers.

L. W. Seeligsberg, who resigned on July 1 as business manager of the ELECTRIC RAILWAY JOURNAL and *Bus Transportation* to engage in industrial advertising service of his own, has established an office at 50 Church Street, New York. He will specialize in the handling of technical and engineering accounts, particularly such accounts as place advertising in trade and technical publications. Mr. Seeligsberg is a graduate of Stevens Institute. He has had more than twenty years experience in the preparation and placing of technical advertising copy, mostly with the McGraw-Hill Company and its predecessors, and knows the markets for materials and equipment, and the possibilities for application and use of technical processes and various types of machinery. Early in his career with the McGraw-Hill Company, Mr. Seeligsberg had charge of its copy service department, a post to which he was advanced because of his ability quickly to discern copy of thought-compelling interest in which the selling points were attractively developed. The ability thus manifested by him naturally led to his advancement with the company to the office of business manager, in which capacity his talents came to be more fully recognized as a force not only in the publishing company itself and among his associates in business, but particularly with advertisers offering service or equipment, or both, for sale. His experience has also covered the solicitation of advertising in the field as a member of the McGraw-Hill sales forces.

New Advertising Literature

Condit Electrical Manufacturing Company, South Boston, has issued a new bulletin, No. 445-2, covering the company's type D-17-A and D-17-B oil circuit breakers.

Sangamo Electric Company, Springfield, Ill., under the title of "Service to the Central Station Industry," has published a very attractive booklet devoted in part to a brief history of the development of the central station industry and in part to views of the works at Springfield, Ill., of the Sangamo Electric Company. The booklet is notable for its attractive typographical make-up.

Good Brakes—Your Best Insurance

Nearly all electric railway cars have emergency brakes, yet it often happens that an accident is directly attributed to bad brakes!

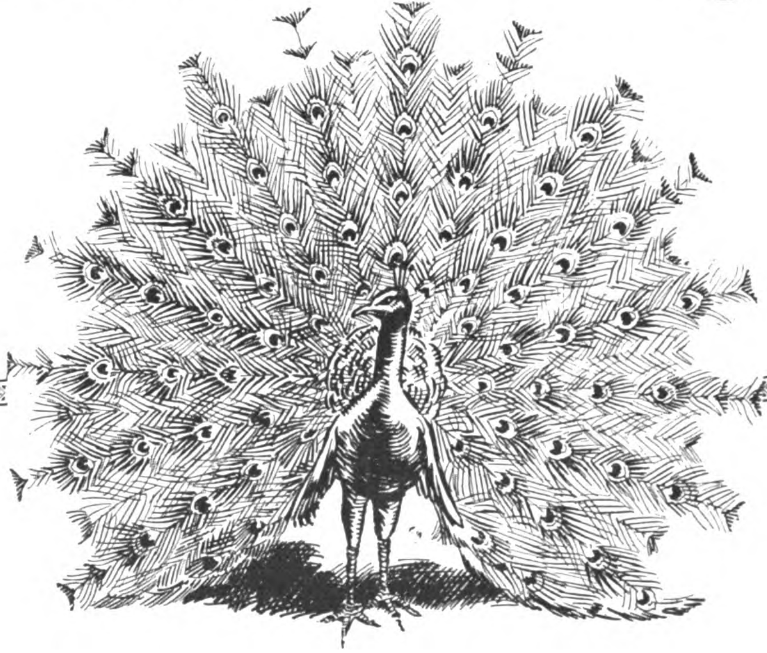
This can only be because operators do not attach enough importance to adequate hand brakes. Such a policy does not create good will. When the big accident does come, the cost of litigation and claims outweighs anything you may save in installation cost.

Safeguard yourself and your line by insisting on—

PEACOCK STAFFLESS BRAKES

The Transportation Department will then have no "come back," for Peacock Brakes are always ready to stop the car smoothly and swiftly, no matter what the load or grade. Motormen like their simplicity, ruggedness and absolute dependability. Big graphite bronze bushings do away with oiling, and cut maintenance to practically nothing. Peacock Brakes will pay for themselves in a short time on upkeep savings alone.

Write for full data on weight, space-saving, etc. Figure it out yourself.



NATIONAL BRAKE COMPANY

890 Ellicott Square
Buffalo, N. Y.

Canadian Representative: Lyman Tube & Supply Co., Ltd., Montreal, Canada

Bankers and Engineers

Ford, Bacon & Davis
Incorporated
Business Established 1894
115 BROADWAY, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

STONE & WEBSTER
Incorporated
EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES
NEW YORK BOSTON CHICAGO

SANDERSON & PORTER
ENGINEERS
REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS
RAILWAY, LIGHT and POWER PROPERTIES
CHICAGO NEW YORK SAN FRANCISCO

THE ARNOLD COMPANY
ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL
105 South La Salle Street
CHICAGO

ALBERT S. RICHEY
ELECTRIC RAILWAY ENGINEER
WORCESTER, MASSACHUSETTS
REPORTS—APPRAISALS—RATES—OPERATION—SERVICE

Dwight P. Robinson & Company
Incorporated
Design and Construction of
Electric Railways, Shops, Power Stations
125 East 46th Street, New York
Chicago Youngstown Montreal
Philadelphia Los Angeles Rio de Janeiro

HEMPHILL & WELLS
CONSULTING ENGINEERS
Gardner F. Wells John F. Layng Albert W. Hemphill
APPRAISALS
INVESTIGATIONS COVERING
Reorganization Management Operation Construction
43 Cedar Street, New York City

WALTER JACKSON
Consultant on Fares, Buses, Motor Trucks
Originator of unlimited ride, transferable weekly pass. Campaigns handled to make it a success.
143 Crary Ave., Mt. Vernon, N. Y.

THE J. G. WHITE ENGINEERING CORPORATION
Engineers—Constructors
Industrial Plants, Buildings, Steam Power Plants, Water Powers, Gas Plants, Steam and Electric Railroads, Transmission Systems
43 Exchange Place, New York

JOHN A. BEELER
Operating, Traction and Traffic Investigations
Routing Surveys—Valuations—Operation
Management
52 Vanderbilt Ave., NEW YORK

ENGELHARDT W. HOLST
Consulting Engineer
Appraisals, Reports, Rates, Service Investigation, Studies on Financial and Physical Rehabilitation
Reorganization, Operation, Management
683 Atlantic Ave., Boston, Mass.

J. ROWLAND BIBBINS
Engineer—921 Fifteenth St., WASHINGTON, D. C.
TRANSPORTATION
Complete Transit Surveys and Development Programs, adapting Motor-Transport, R.R. Terminal and City Plans. Traffic, Service, Routing, Operation and Valuation. EXPERIENCE IN 20 CITIES

JOE R. ONG
Consulting Transportation Engineer
Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation
PIQUA, OHIO

Parsons, Klapp, Brinckerhoff & Douglas
WM. BARCLAY PARSONS H. M. BRINKERHOFF
EUGENE KLAPP W. J. DOUGLAS
Engineers—Constructors—Managers
Hydro-electric Railway Light and Industrial Plants
Appraisals and Reports
CLEVELAND NEW YORK
1570 Hanna Bldg. 84 Pine St.

DAY & ZIMMERMANN, INC.
ENGINEERS
Design, Construction
Reports, Valuations, Management
NEW YORK PHILADELPHIA CHICAGO

JAMES E. ALLISON & CO.
Consulting Engineers
Specializing in Utility Rate Cases and Reports to Bankers and Investors
1017 Olive St., St. Louis, Mo.

AMERICAN BRIDGE COMPANY
EMPIRE BUILDING, 71 BROADWAY, NEW YORK

Manufacturers of Steel Structures of all classes, particularly
BRIDGES AND BUILDINGS

Sales Offices:

NEW YORK, N. Y. ....71 Broadway
Philadelphia, Pa. ....Widener Building
Boston, Mass. ....120 Franklin Street
Baltimore, Md. ....Continental Building
PITTSBURGH, PA. ....Frick Building
Cincinnati, Ohio ....Union Trust Building
Cleveland, Ohio ....Guardian Building
Detroit, Mich. ....Beecher Ave. & M. C. R. R.
CHICAGO, ILL. ....208 South La Salle Street
St. Louis, Mo. ....Liberty Central Trust Bldg.
Denver, Colo. ....First National Bank Bldg.
Salt Lake City, Utah ....Walker Bank Building
Duluth, Minn. ....Wolvin Building
Minneapolis, Minn. ....7th Ave. & 2d St., S.E.

Pacific Coast Representative:
U. S. Steel Products Co., Pacific Coast Dept.
San Francisco, Cal. ....Rialto Building
Portland, Ore. ....Selling Building
Seattle, Wash. ....4th Ave. So., Cor. Conn. St.

Export Representative: United States Steel Products Co., 30 Church St., N. Y.

EDWIN WORTHAM, E.E.
Consulting Engineer
Valuations of Electric Railways and Utilities of All Kinds
Traffic and Operating Studies
Allison Bldg. Richmond, Va.
Established Feb. 1913.

ANDREW SANGSTER & COMPANY
Consulting Accountants
New York and Chicago
Rate Investigations Consolidations
Depreciation Studies Reports to Bankers
25 Broadway, New York

STEVENS & WOOD, INC.
Design and Construction of Power Stations
Railroad Electrification, Industrial Plants
REPORTS AND APPRAISALS
Management and Financing of Utilities and Industrials
Youngstown New York

Byllesby
Engineering & Management
Corporation
208 S. La Salle Street, Chicago
New York Tacoma

Transmission Line and Special Crossing Structures, Catenary Bridges
WRITE FOR OUR NEW DESCRIPTIVE CATALOG
ARCHBOLD-BRADY CO.
Engineers and Contractors SYRACUSE, N. Y.

KELLY, COOKE & COMPANY
Engineers
149 BROADWAY
NEW YORK
424 CHESTNUT STREET
PHILADELPHIA

THE P. EDWARD WISH SERVICE
50 Church St. *Street Railway Inspection* 131 State St.
NEW YORK DETECTIVES BOSTON

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

STEEL
'CARNEGIE'
When yo think of Steel—think of Carnegie

Tailor-Made Advertising

One great fact must be remembered by those who have made the decision to advertise. The advertising plan must fit the business to which it is applied. There are no ready-to-wear advertising plans; each one must be tailor made.

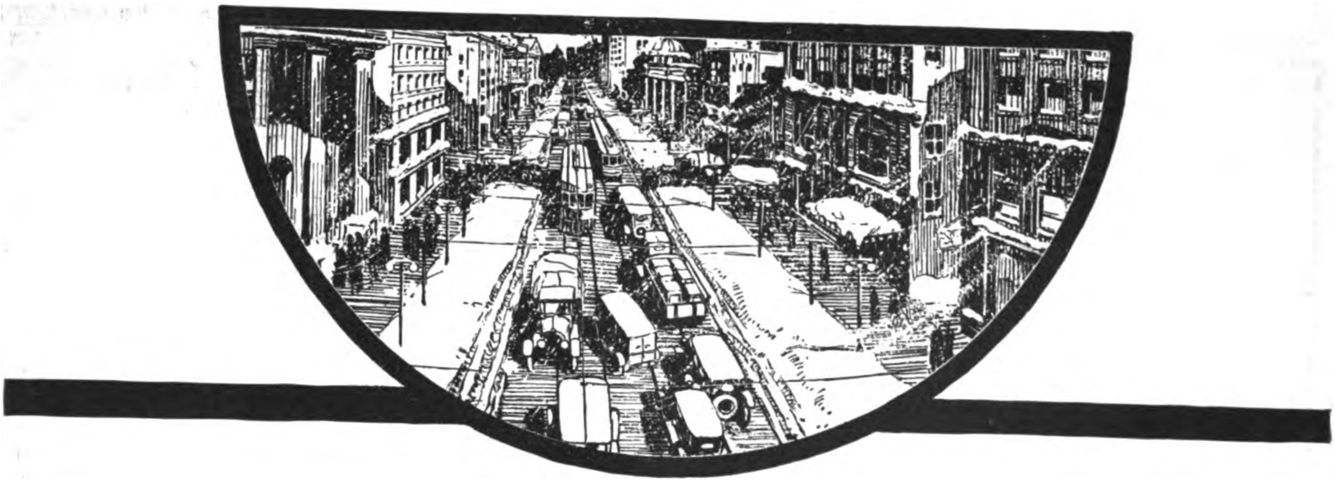
The purpose of advertising is to increase business and *not* to relieve any one of his arduous duties. The manufacturer's salesman who regards advertising as a substitute for his own efforts has missed the point. His efforts are needed more than ever to support the advertising and put it across. His reward is larger sales.

Likewise, the merchant who chooses the advertised brands because they are "soft and easy" selling, has overlooked the essential idea. Certainly they sell easier; but this is not the big important truth. Rather, he should see that the manufacturer's advertising is an instrument put into his hands for increasing his volume and speeding up his turnover. Looking at the matter in this light, he will bend every effort to co-operate with the advertising and seek to make it pay him additional profits.

Advertising is not a form of perpetual motion that goes on forever without human assistance. The biggest problem any man has to settle after he has determined to advertise, and decided *how* to advertise, is this: How can I *use* my advertising so as to get the most out of it? Without close-linked co-operation it dissipates its force into air.

It must be hitched on to a business properly. Then it must be utilized with intelligence. When these conditions are fulfilled it does a type of work for which there is no efficient substitute.

[Published by *Electric Railway Journal* in co-operation with The American Association of Advertising Agencies]



Winter punishes paving

IT'S hot weather now—streets are open for traffic from curb to curb. Winter brings a changed condition.

Then, when your plows or sweepers have cleared a narrow aisle through the snow, all traffic concentrates down that aisle and the wear and tear on your strip of paving is multiplied out of all proportion to summer usage.

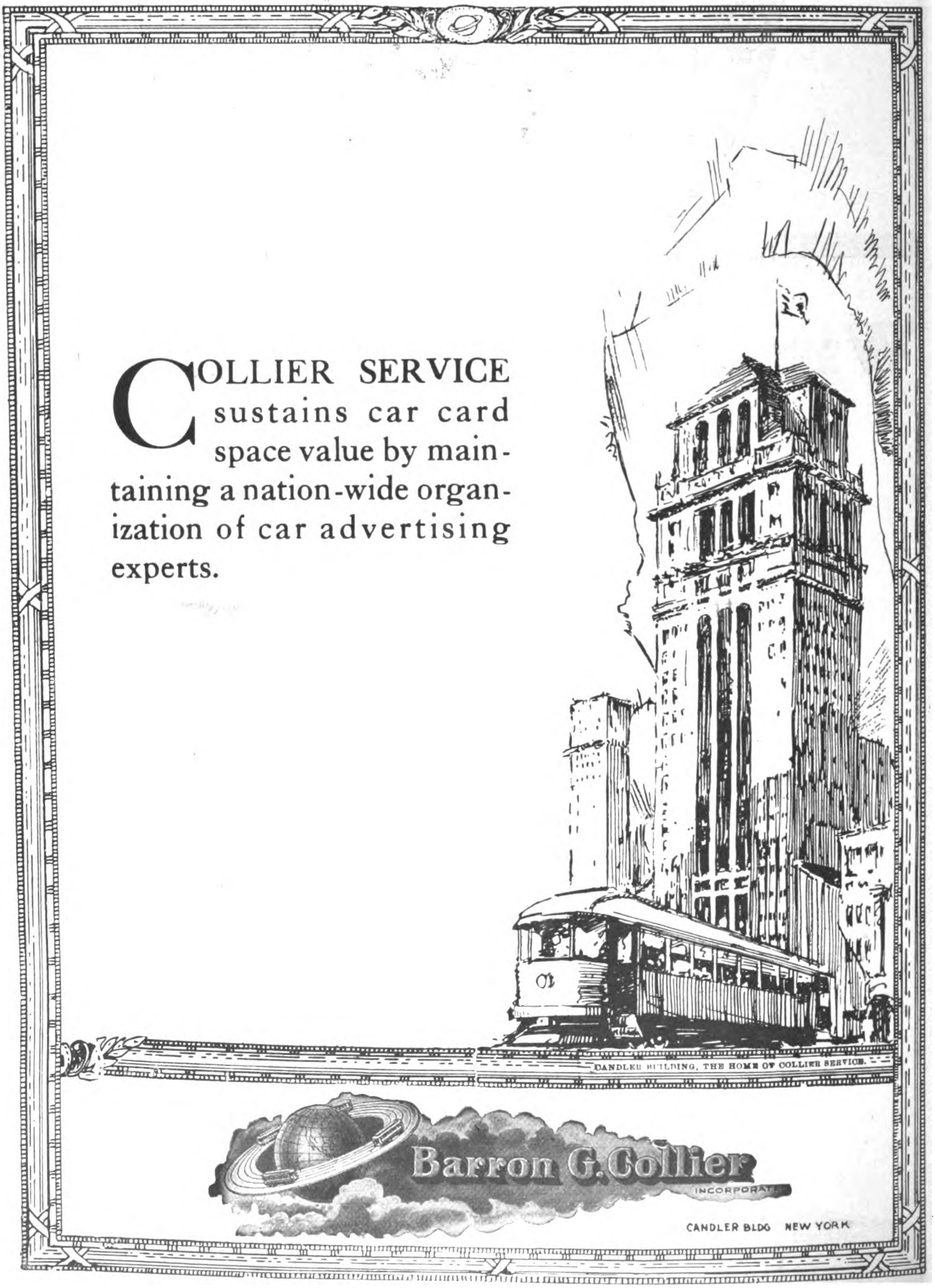
Then you are fortunate if you have paved with vitrified paving brick, asphalt filled. The grind of truck and auto chains leaves the fire toughened brick unscathed. The crash and jolt is absorbed by the flexible wearing surface. The dense, tough brick resists abrasion. Your road bed is protected by the water tight seal of the filler.

It pays—and saves—to pave with brick.

NATIONAL PAVING BRICK
MANUFACTURERS ASSOCIATION
ENGINEERS BUILDING • • CLEVELAND, OHIO

VITRIFIED
Brick
PAVEMENTS

OUTLAST THE BONDS



COLLIER SERVICE sustains car card space value by maintaining a nation-wide organization of car advertising experts.

CANDLER BUILDING, THE HOME OF COLLIER SERVICE.

Barron G. Collier
INCORPORATED

CANDLER BLDG NEW YORK

Take a tip from Nature—

BOYERIZE!

Brother Turtle's body isn't tough enough for this hard World. And yet he often manages to live a couple of centuries, simply because nature has given him a shell so hard it will stop a bullet.

Ordinary steel isn't tough enough for modern car brake parts. The strains are too great. So we've given Boyerized Brake Parts a glossy coat of glass hard armor that enables them to outwear ordinary casehardened steel *three to four times*.

Sounds impossible, but it has been proved time and again, under everyday conditions.

Choose these Products
They're **BOYERIZED**

STAG BRAND BRAKE PINS

- **Brake Pins**
- **Brake Hangers**
- **Brake Levers**
- **Pedestal Gibs**
- **Brake Fulcrums**
- **Center Bearings**
- **Side Bearings**
- **Spring Post Bushings**
- **Spring Posts**
- **Bolster and Transom Chafing Plates**
- **Manganese Brake Heads**
- **Manganese Truck Parts**
- **Bushings**
- **Bronze Bearings**

Bemis Car Truck Company

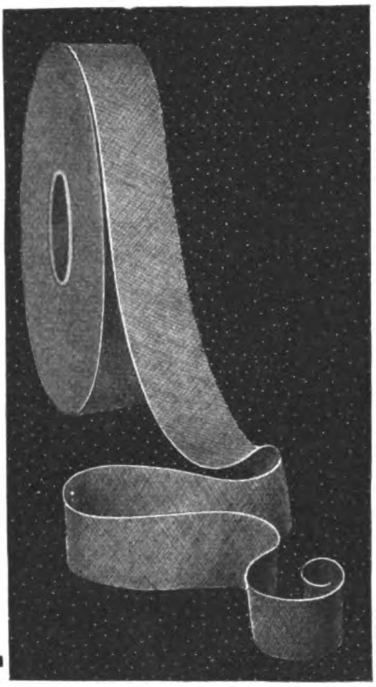
Electric Railway Supplies

Springfield, Mass.

Representatives:

Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 54 First Street, Portland, Oregon
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.

Increase Output
—Lower Costs



with IRVINGTON
Seamless Bias Tape

Irvington Seamless Bias Tape is better because every inch is effective insulation of uniform thickness. It gives you a direct gain in productive labor. It makes smooth windings, and it can be applied with taping machines. There is a minimum of air pockets and a minimum requirement of impregnating varnish.

Furnished in Yellow and Black .007 in. to .015 in. thick, ½ in. to 36 in. wide, on paper cores ⅜ or 1½ in. hole, standard length rolls, 36 and 72 yards.

Ask for samples and prices.

Made by the largest manufacturer of varnished cambric in the world.

IRVINGTON VARNISH & INSULATOR Co.
Irvington, New Jersey.

Established 1905

Sales Representatives:
Mitchell-Rand Mfg. Co., New York
T. C. White Electrical Supply Co., St. Louis
E. M. Wolcott, Rochester
L. L. Fleig & Co., Chicago
Consumers Rubber Co., Cleveland
Clapp & Lamoree, Los Angeles
F. G. Scofield, Toronto

Griffin Wheel Company
McCormick Building
Chicago, Ill.

GRIFFIN
F. C. S.
WHEELS

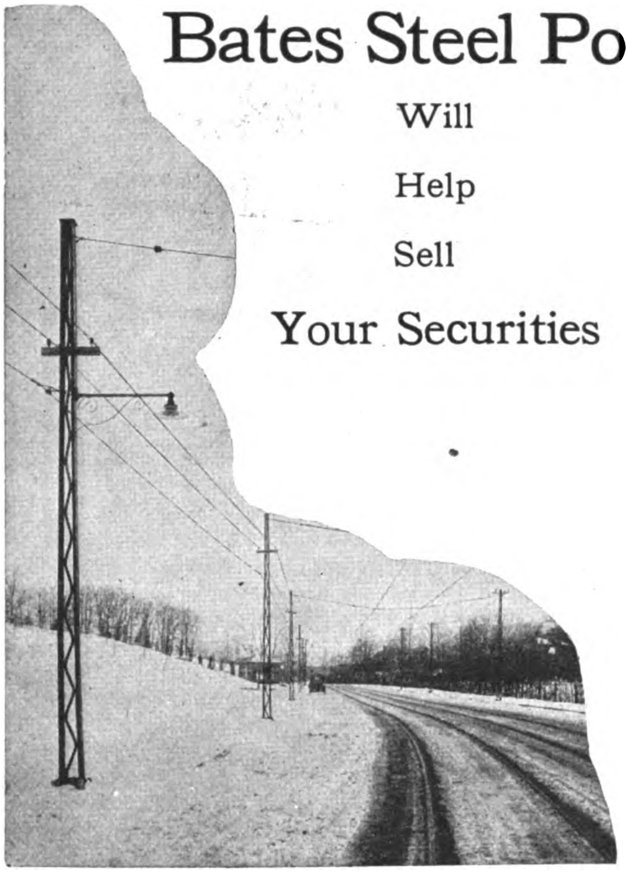
For Street and Interurban Railways

FOUNDRIES:
Chicago
Detroit
Denver
Boston
Kansas City
Council Bluffs
St. Paul
Los Angeles
Tacoma

T. S. Q
says

"I worked for one railway line a while & got fired. They thot cheaper help would do. Then they found out — I'm back on the job, again for life the boss says.

Tool Steel Quality



Bates Steel Poles

Will
Help
Sell
Your Securities

Use Bates Steel Poles with your other first-class equipment and the whole installation will be permanent and an inducement for your security buyers.

Bates Pole installations are easily maintained. All surfaces are exterior, therefore are quickly and cheaply painted. Bates Pole prices are surprisingly low.

Bates Expanded Steel Truss Co.
ILLINOIS MERCHANTS BANK BLDG.
CHICAGO, ILL.

Have you your Bates Treatise on Steel Poles?

BATES ONE PIECE EXPANDED STEEL POLES

Your Passengers Will Enjoy Their Ride On
Hale & Kilburn Seats

Especially Designed for
One Man Safety Cars

Lightest Weight Stationary Steel Seat

Lightest Weight Walkover Steel Seat

Lightest
Strongest
Simplest
Neatest

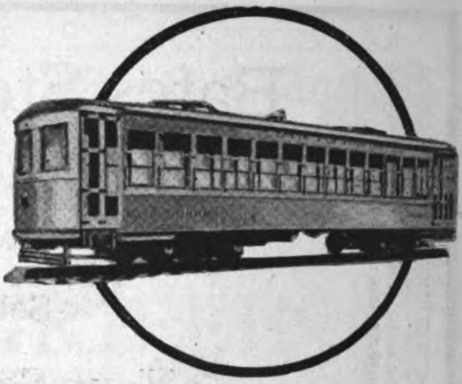
No higher in price than others
Write for particulars

Hale & Kilburn Corporation
American Motor Body Company, *Successors*
PHILADELPHIA

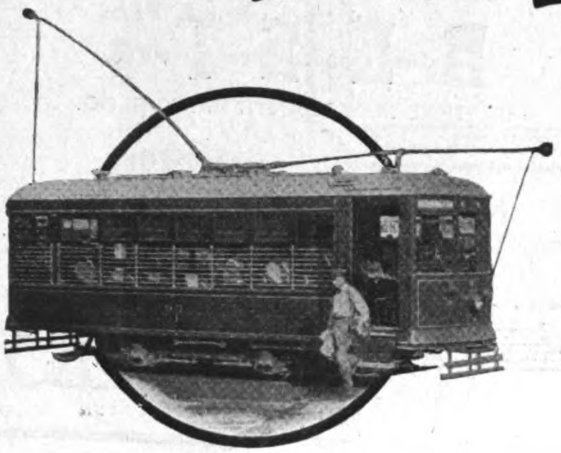
New York 30 Church St.
Chicago McCormick Bldg.
Richmond Mutual Bldg.
Atlanta Candler Bldg.
San Francisco 71 First St.
Los Angeles 447 E. 3rd St.

A car in sight settles the "walk or ride" question

"Oh, it's only a few blocks—quicker to walk." That's the argument of the busy man, who sees no car in sight, when he hops to the corner. Thousands like him will ride if they get better service.



St. Louis Quality Cars

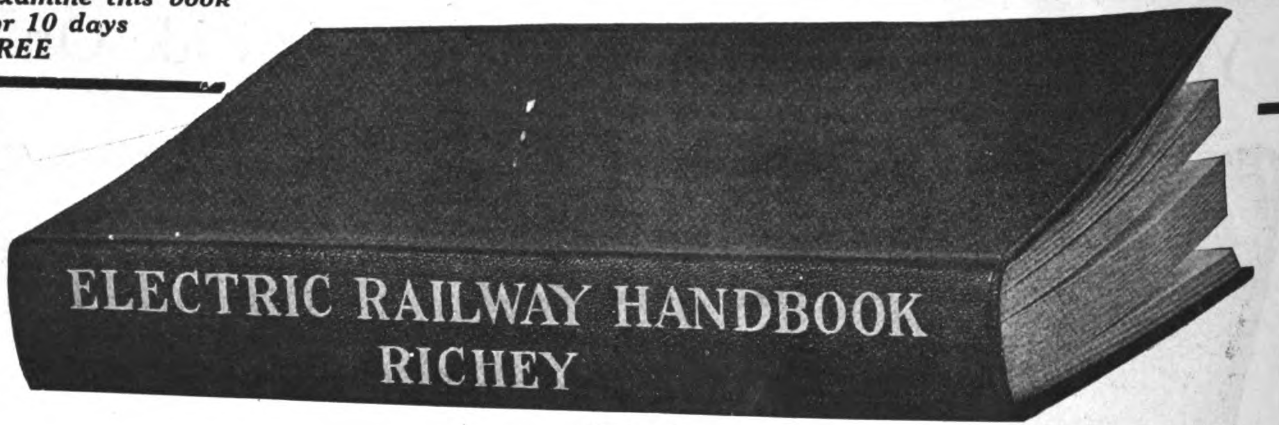


And good service is more a matter of right equipment than of cost. St. Louis Safeties, either double-truck or single-truck, have the speed and economy which make a "car-in-sight" policy possible without appreciable increase in operating cost.

Ask us for the figures before buying new cars.

St. Louis Car Company
St. Louis, Mo.
"The Birthplace of the Safety Car"

Examine this book for 10 days FREE



Richey's
Electric Railway Handbook

832 *pages, flexible.* 4 x 7, *over* 600 *illustrations,* $4.00 *net, postpaid.*

A pocket encyclopædia of practical information on electric railway work. This book contains the data, formulae and tables that are constantly required by the operating, constructing or designing engineer. It is a book which may be used by the non-technical manager as well as the engineer.

The first step to bigger pay—

- I. Roadbed and Track.
- II. Train Movements.
- III. Train Movements.
- IV. Railway Motors.
- V. Controlling Apparatus.
- VI. Current Collecting Devices.
- VII. Trucks.
- VIII. Braking.
- IX. Rolling Stock.
- X. Transmission and Distribution.
- XI. Signals and Communication.

Free Examination Coupon

McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York, N. Y.

You may send me on 10 days' approval **Electric Railway Handbook, $4.00 net.** I agree to pay for the book or return it postpaid within 10 days of receipt.

Regular subscriber to the Electric Railway Journal?........................

Member of A. I. E. E. or A. E. R. A.?........................

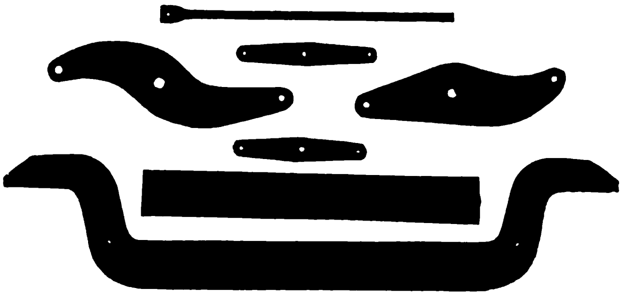
Signed ....

Address ....

Official position........................

Name of company........................

(Books sent on approval to retail purchasers in the U. S. and Canada only.) F.E

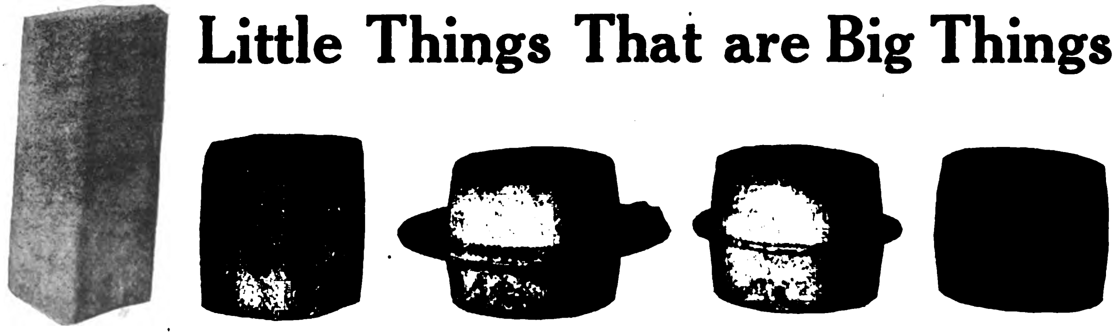


The COLUMBIA Car and Truck Parts

Brake Parts and Brake Rigging

COLUMBIA MACHINE WORKS

3313 Atlantic Ave., Brooklyn N. Y.



Little Things That are Big Things

Nuttall discovered that the average pinion was only about half as strong transversely, or across the teeth in the direction its load came, as it was longitudinally where strength was not so important.

Now Nuttall pinions are forged by a process that nearly equalizes the strength in both directions. The above picture shows the several steps in the forging process—apparently a little thing, but after all a big step toward better pinions.

R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

AMELECTRIC PRODUCTS
BARE COPPER WIRE AND CABLE
TROLLEY WIRE
WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
MAGNET WIRE

Reg. U. S. Pat. Office

Incandescent Lamp Cord

AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.
Boston, 176 Federal; Chicago, 112 W. Adams;
Cincinnati, Traction Bldg; New York, Pershing Sq. Bldg.

International Creosoting & Construction Co.
Galveston, Texas
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MONEY SAVERS TO RAILWAYS

Treated railway ties, poles, piling, bridge timbers, etc.

See our full page advertisement in last week's issue.

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FRICTION TAPE
THE OKONITE COMPANY
PASSAIC, N.J.
U.S.A.

are
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Products

'Nuff Said!

DUNDEE
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FRICTION TAPE
THE OKONITE COMPANY
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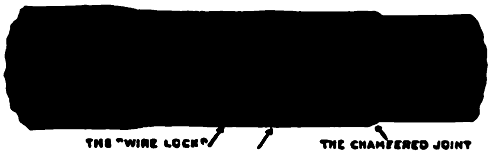
Write for Samples and Circulars

THE OKONITE CO., Passaic, N. J.
Incorporated 1884
Sales Offices: New York—Atlanta—San Francisco
Agents: Central Electric Co., Chicago, Ill.; Pettingell-Andrews Co., Boston. Mass.; The F. D. Lawrence Electric Co., Cincinnati, Ohio; Novelty Electric Co., Philadelphia, Pa.

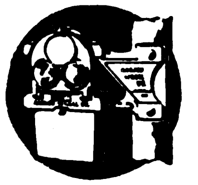
OKONITE
TRADE MARK

ELRECO TUBULAR POLES



COMBINE
Lowest Cost Lightest Weight
Least Maintenance Greatest Adaptability
Catalog complete with engineering data sent on request
ELECTRIC RAILWAY EQUIPMENT CO.
CINCINNATI, OHIO
NewYork City, 30 Church Street

AUTOMATIC SIGNALS
Highway Crossing Bells
Headway Recorders
NACHOD SIGNAL COMPANY, INC.
LOUISVILLE, KENTUCKY.



AETNA INSULATION LINE MATERIAL
Third Rail Insulators, Trolley Bases, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches
Albert & J. M. Anderson Mfg. Co.
289-93 A Street Boston, Mass.
Established 1877
Branches—New York, 135 B'way
Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St.
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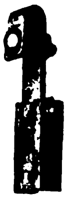
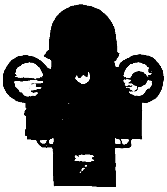
Shaw Lightning Arresters
Standard in the Electric Industries for 35 years
Henry M. Shaw
150 Coit St., Irvington, Newark, N. J.



Peirce Sign Hangers
For Span Wires
Always keep the signs vertical
HUBBARD & COMPANY
Pittsburgh Chicago



U. S. ELECTRIC AUTOMATIC SIGNAL
for single track block signal protection
United States Electric Signal Co.
West Newton, Mass.

Chapman
Automatic Signals
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INSULATED WIRES AND CABLES
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Conway Building, Chicago, Ill.
THE AMERICAN BRASS COMPANY
General Offices: Waterbury, Conn.

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Send for new
Rail Bond Book

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CREOSOTERS
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Treated and Untreated

We solicit your inquiries

Creosoting Plant located
Washington Court House, Ohio
On—Penna. R.R., B. & O. R.R., D. T. & I. R.R.
Operating Mills in Southern Ohio

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205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of
Special Work for Street Railways
Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
IMPROVED ANTI-KICK BIG-HEEL SWITCHES
HARD CENTER AND MANGANESE
CONSTRUCTION

New York Switch & Crossing Co.
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SPECIALISTS
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Design and Manufacture
of
Standard—Insulated—and
Compromise Rail Joints

The Rail Joint Company
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Lorain Special Trackwork
Girder Rails

Electrically Welded Joints

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Johnstown, Pa.

Sales Offices:
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Pacific Coast Representative:
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THE BABCOCK & WILCOX COMPANY
85 LIBERTY STREET, NEW YORK

Builders since 1868 of Water Tube Boilers of continuing reliability

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Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893

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WHARTON
Special Trackwork
For Street and Steam Railways

Steel Castings **Gas Cylinders**
ORIGINATORS OF
Manganese Steel Trackwork

WM. WHARTON JR. & CO., Inc.
Easton, Pa.
Other Plants:
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.
Tioga Steel & Iron Co., Philadelphia, Pa.
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The Differential Car

An automatic dump car, an electric locomotive, a snow plow, and a freight car—all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation.

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Findlay, Ohio

Series Type
Arc Welding and Bonding Outfit

Rugged series resistance coil
Indestructible Mica insulation
Normal welding current at half voltage

The Electric Railway Improvement Co.
Cleveland, Ohio

ERICO RAIL BONDS

"Make it of Vul-Cot Fibre"

NATIONAL VULCANIZED FIBRE CO.
WILMINGTON DELAWARE

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Electrical Machinery, Steam Turbines, Steam Engines, Condensers, Gas and Oil Engines, Air Compressors, Air Brakes

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Lapp Insulator Co. Inc. LeRoy, N.Y.
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RAMAPO AJAX CORPORATION
Ramapo Automatic Return Switch Stands for Passing Sidings
RACOR TRADE MARK
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GENERAL OFFICES: HILLBURN, NEW YORK
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Adapted to all types of rails and paving.

W. S. GODWIN CO., Inc.

Proven by service to economically prevent seepage and disintegration of street railway paving.
Write for Illustrated Catalog No. 20.
Race & McComas Sts.,
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STANDARD
Wires, Cables, Cable Accessories
Superior quality, economical prices
Standard Underground Cable Co.
Boston Philadelphia Pittsburgh Detroit
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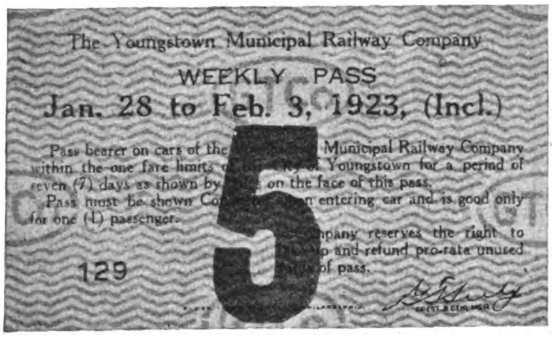
STANDARD
TRADE MARK

The Modern Touch


The Youngstown Municipal Railway Company

WEEKLY PASS

Jan. 28 to Feb. 3, 1923, (Incl.)

5

Pass bearer on cars of the Municipal Railway Company within the one fare limits of Youngstown for a period of seven (7) days as shown by on the face of this pass.

Pass must be shown Co n entering car and is good only for one (1) passenger.

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Think of the time saved when your car reaches a crowded corner, and at least two-thirds of the people simply show Globe Weekly Passes as they go by the conductor. Nothing at all to handle! Absolutely no time lost!

This is the twentieth century idea of handling crowds—it is new and growing. The people think it's great.

Railway Owners say Globe Passes are profitable. Give them a chance on your lines, and see what happens.

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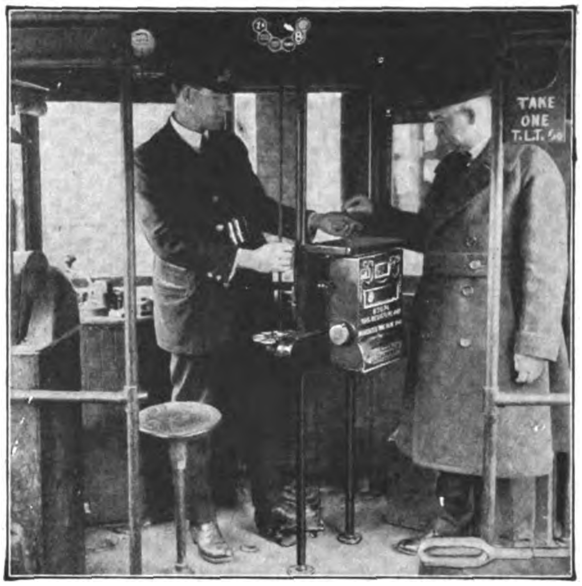
Los Angeles New York San Francisco



An Ohmer One Man Car Installation

Ohmer Indicating and Recording Fare Registers apply correct business methods to the sale of electric railway transportation.

OHMER FARE REGISTER CO.

Dayton, Ohio

CLEVELAND FARE BOXES

always

Fit the Fare and Fare Collection System

The Cleveland Fare Box Co.

Cleveland, Ohio

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Preston, Ontario

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Type R-10

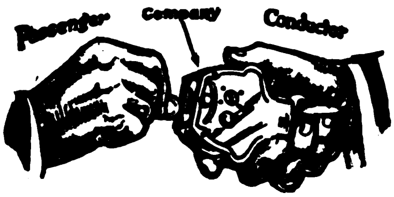
International Registers

Made in various types and sizes to meet the requirements of service on street and city system. Complete line of registers, counters and car fittings.

Exclusive selling agents for HEEREN ENAMEL BADGES.

The International Register Co.

15 South Throop Street, Chicago, Illinois



Direct Automatic Registration By the Passengers

Rooke Automatic Register Co.

Providence, R. I.

SAMSON SPOT WATERPROOFED TROLLEY CORD

Trade Mark Reg. U. S. Pat. Off.

Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.

PS HEATERS

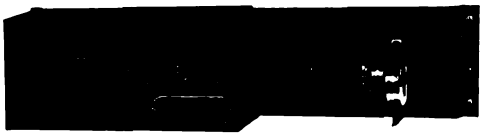
Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company

1725 Mt. Elliott Ave., Detroit, Mich.

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



No. 478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

Heywood-Wakefield
REG.U.S.PAT.OFF

RATTAN

For Car Seats or Snow Sweepers

CLOSELY woven Rattan Car Seat Webbing furnished canvas lined or unlined in widths from 12 to 48 inches. Write for prices and samples.

Snow Sweeper Rattan is carefully selected for its toughness. It is furnished in natural or cut lengths and will produce snow sweeping brooms of the most serviceable nature.

Car Seats, cross or longitudinal, covered with Rattan, Plush or Leather.

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Factory: **WAKEFIELD, MASS.**

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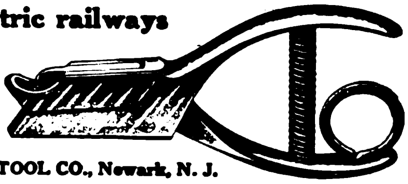
75% of the electric railways use

B-V Punches



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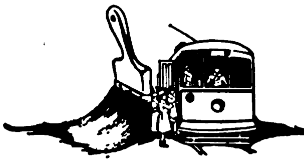
BONNEY-VEHSLAGE TOOL CO., Newark, N. J.

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut



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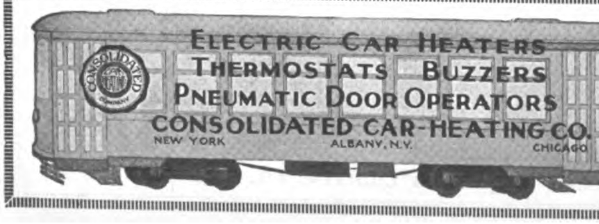
Sells Transportation

Let our experts on railway car finishing demonstrate Beckwith Chandler paints and varnishes. Write for details.

Beckwith-Chandler Co., 203 Emmett St., Newark, N. J.



TULC
A LUBRICANT

We make a specialty of

ELECTRIC RAILWAY LUBRICATION

We solicit a test of TULC
on your equipment

The Universal Lubricating Co.
Cleveland, Ohio

B. A. Hegeman, Jr., President Charles C. Castle, First Vice-President
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National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York

BRANCH OFFICES:
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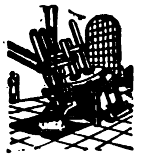
Pittsburgh Forge & Iron Co.'s Products
Anglo-American Varnish Co., Varnishes, Enamels, etc.
National Hand Holds
Drew Line Material and Railway Specialties
Genesco Paint Oils
Turnstile Car Corporation Turnstiles
Economy Electric Devices Co.,
Power Saving & Inspection Meters
Fort Pitt Spring & Mfg. Co., Springs
C-H Electric Heaters
Garland Ventilators
E-Z Car Control Corporation Safety Devices
Lind Aluminum Field Coils
Flaxlinum Insulation
National Safety Car Equipment Co.'s One-Man Safety Cars
Anderson Slack Adjusters

BUCKEYE JACKS

high-grade R. R. Track and Car Jacks

The Buckeye Jack Mfg. Co.
Alliance, Ohio

MOORE RAPID **'LECTROMELT** FURNACES



MAKE YOUR OWN STEEL AND IRON CASTINGS WHEN AND AS YOU NEED THEM

PITTSBURGH ELECTRIC FURNACE CORPORATION

Largest Maker of Arc Furnaces in the World
PITTSBURGH, PA.

RAILWAY UTILITY COMPANY

Sole Manufacturers
"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings; also ELECTRIC THERMOMETER CONTROL of Car Temperatures.

141-151 West 22d St.
Chicago, Ill.

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New York, N. Y.

N-L VENTILATORS

Write for new catalogue
"Superior Ventilation"

THE NICHOLS-LINTERN COMPANY
7960 Lorain Ave., Cleveland, Ohio.
N-L Products manufactured and sold in Canada by
Railway and Power Engineering Corporation, Ltd.
133 Eastern Avenue, Toronto, Ontario

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Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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1 to 3 inches	$4.50 an inch
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An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E. R. J.

POSITIONS WANTED

AN executive of broad experience in dealing with the public and city officials, and who has successfully managed a good sized city property for a number of years, will be open for engagement after September 1st and would like to communicate with owners of property that requires building up, with a view of taking charge of same. If interested address Care A. N. J. Smith, Box 202, Newmarket, New Hampshire.

MANAGER, assistant manager or general superintendent, twenty years' experience in electrical railway work, principally interurban, available August first. Technical. Successful organizer. Tactful in public relations. Very resourceful in rehabilitating property. Energetic and capable executive. Successful record as an economical operator. Prefer connection with electrified steam road or interurban railway. State complete information first letter. PW-586, Electrical Railway Journal, Old Colony Bldg., Chicago, Ill.

MR. MANAGER, are you in the field for a superintendent of transportation? If so, you should realize that practical experience is an important factor in the successful handling of this department. The writer of this ad has a proven successful record of nineteen years on city, suburban and interurban properties and can furnish high grade references as to character and ability to get results on any property regardless of size or condition of same; at present with large property; personal reasons for making a change. PW-595, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

MASTER mechanic wants position, 18 years' experience rebuilding and maintenance cars, armature winding. Best reference. PW-593, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

MASTER mechanic wants position with city or interurban properties; experienced in cars, locomotives and substation maintenance; platform and multiple unit control, straight and automatic air; building and rebuilding trucks and bodys, state complete offer and equipment first letter. PW-592, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

POSITIONS WANTED

SUPERINTENDENT of equipment or master mechanic; twenty-three years' experience on city and interurban properties; have handled construction on transmission lines, substations, power plants, track and trolley work; available any time. PW-594, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

TEN years' experience in design, construction, maintenance and valuation of large electric and steam railways. Especially experienced in valuation and in bridge, building, dock, wharf and heavy concrete construction. Like position as valuation engineer or superintendent construction. PW-590, Elec. Ry. Journal, Leader-News Bldg., Cleveland, Ohio.

YOUNG man with six years' banking experience and electrical technical education, desires responsible position in accounting or operating departments. Desirous of learning technique of railway operation and willing to undergo training to learn things at first hand. Have always made the study of electric railway operation a hobby. Best of references. PW-591, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

FOR SALE

26 K-34 Controllers

TRANSIT EQUIPMENT COMPANY
Cars—Motors
501 Fifth Avenue, New York

FOR SALE

20—Peter Witt Cars

Weight Complete, 33,000 lbs.

Seats 53, 4—G. E. No. 258-C Motors. K-12-H Control, West. Air Taylor Trucks. R.H. Type. Complete.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

Good Relaying Rails

Are as Serviceable as New Rails, with a Big Saving on the Price

We have ready for prompt shipment First-Class Relaying Rails in various weights. Get in touch with us, stating what weight rail and tonnage desired, and we will submit quotations.

HYMAN-MICHAELS COMPANY

531 Peoples Gas Bldg., Chicago

OFFICES AND PLANTS AT
St. Louis, Mo.
Detroit, Mich.
Pittsburgh, Pa.
San Francisco, Cal.
New York
McKees Rocks, Pa.

WANTED

Crushed Stone Car

Two or three compartments. Total capacity 15 to 25 ton.

W-588, Electric Railway Journal
10th Ave. at 36th St., New York City.

Responsible New York Sales Company

in business 10 years, will handle additional lines technical preferred, on commission, also carry accounts. Address

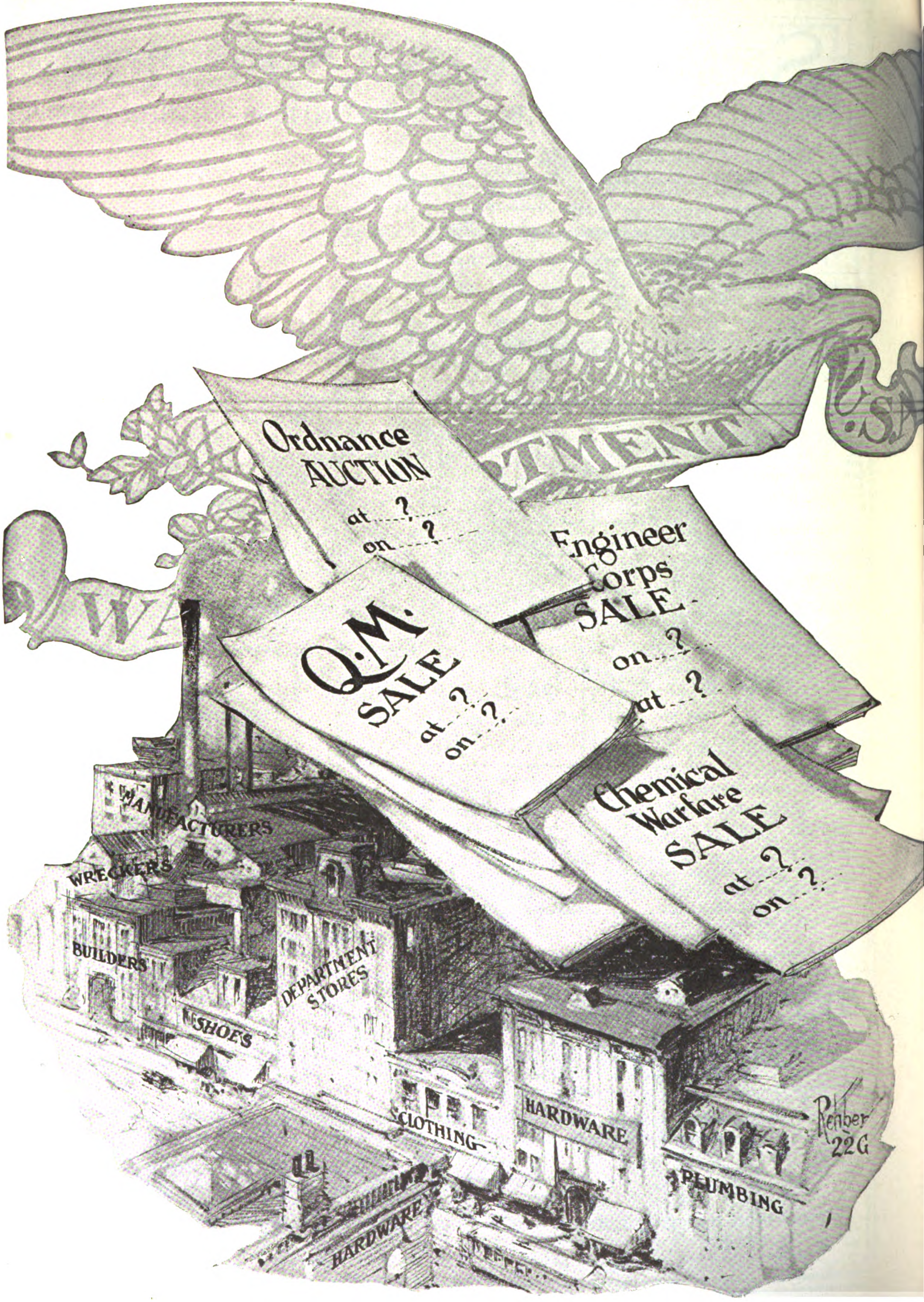
A.D., Room 1176,
Woolworth Bldg., N. Y. City.

It Pays to *Watch* This Page

EVERY ADVERTISEMENT on this page provides an opportunity for some owner to sell his machinery immediately. It will pay you to keep track of what other readers want.

If **you** need equipment and don't find it in the For Sale pages, put **your** card here. It will tell other readers what **you** want.

It Pays to *Use* This Page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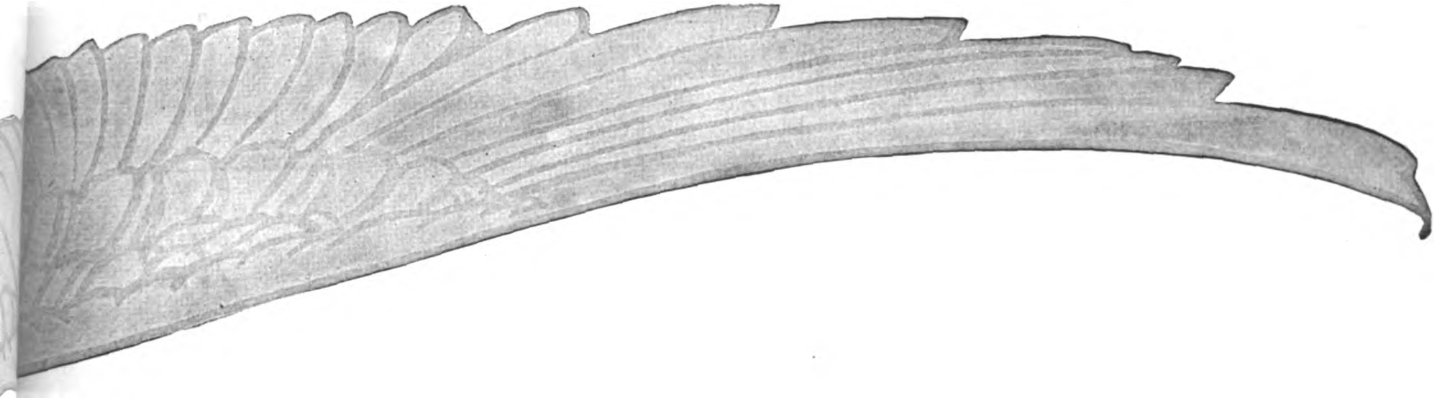

Investigate Army Sales—

first— to protect business
second—to aid business

Many hundreds of business men have made a good profit and stimulated sales in their own business by buying from the War Department.

There is another side, however—a side which perhaps you have forgotten—forgotten because it has been so successful—

The fulfillment of the Government's promise to protect the country by removing the menace of dumped stocks.

It is not the plan to merely transfer the load from the Government to a few individuals. That would place surplus stocks where they could not be controlled.

The Government, by a wide distribution of War Department material, has scattered these stocks through trade and industry in such a manner that business has been aided rather than hampered.

And those who have first investigated War Department Sales, and then purchased, have individually shared a worthwhile profit, in a worthwhile enterprise.

It is for these reasons that the Government asks that all business men cooperate by investigating what the Sales of War Surplus may hold for them in the way of direct, as well as indirect, profit.

The Way to Investigate

Watch your Commercial Business Publication and the Metropolitan Dailies for announcements of specific auction or sealed bid sales.

Send for the Catalog mentioned in the announcement. Check off the items that interest you.

Send a representative to the sale to inspect the materials—in advance, *if possible.*

To ensure you more leeway, send your name and address at once to Major J. L. Frink, Chief, Sales Promotion Section, Room 2515, Munitions Building, Washington, D. C. Advise him the character of materials you are interested in, and catalogs containing such materials will be forwarded you as rapidly as sales are scheduled.

Final commodity sales will begin in September and continue until liquidation of stocks is completed at the Quartermaster Depots in Brooklyn, Chicago, San Antonio and San Francisco. Offerings include a wide range of Quartermaster Supplies, Ordnance Property and smaller quantities of Engineer Property, Chemical Warfare and Medical and Hospital Supplies.

Important sales of Real Estate, Buildings, Plants and Warehouses will be held at Camp Devens, Ayer, Mass.; Camp Mead, Md.; Ordnance Reserve Depot, Amatol, N. J.; Ordnance Reserve Depot, Toledo, O.; Camp Knox, Louisville, Ky., and Camp Lewis, American Lake, Wash. Definite dates will be announced later.

Look for the Eagle before you shop

WAR DEPARTMENT

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

- **Advertising, Street Car**
  - Collier, Inc., Barron G.
- **Air Receivers, Aftercoolers**
  - Ingersoll-Rand Co.
- **Anchors, Guy**
  - Electric Service Sup. Co.
  - Ohio Brass Co.
  - Standard Steel Works Co.
  - Westinghouse E. & M. Co.
- **Armature Shop Tools**
  - Electric Service Sup. Co.
- **Automatic Return Switch Stands**
  - Ramapo Ajax Corp.
- **Automatic Safety Switch Stands**
  - Ramapo Ajax Corp.
- **Axles**
  - Bemis Car Truck Co.
- **Axles, Car Wheel**
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
  - Carnegie Steel Co.
  - Westinghouse E. & M. Co.
- **Axle Straighteners**
  - Columbia M. W. & M. I. Co.
- **Babbitting Devices**
  - Columbia M. W. & M. I. Co.
- **Badges and Buttons**
  - Electric Service Sup. Co.
  - Internat'l Register Co., The
- **Barges, Steel**
  - American Bridge Co.
- **Bearings an Bearing Metals**
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - Gilbert & Sons, B. F. A.
  - Westinghouse E. & M. Co.
- **Bearings Center and Roller Side**
  - Stucki Co., A.
- **Bells and Gongs**
  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
  - Consolidated Car-Heating Co.
  - Electric Service Sup. Co.
- **Boilers**
  - Babcock & Wilcox Co.
- **Bonding Apparatus**
  - American Steel & Wire Co.
  - Elec. Service Supplies Co.
  - Ohio Brass Co.
  - Railway Track-Work Co.
- **Bonds, Rail**
  - American Steel & Wire Co.
  - Elec. Service Supplies Co.
  - General Electric Co.
  - Ohio Brass Co.
  - Railway Track-Work Co.
  - Westinghouse E. & M. Co.
- **Brackets and Cross Arms (See also Poles, Ties Posts, etc.)**
  - Bates Exp. Steel & Tr. Co.
  - Elec. Ry. Equipment Co.
  - Elec. Ry. Improvement Co.
  - Elec. Service Supplies Co.
  - Hubbard & Co.
  - Ohio Brass Co.
- **Brake Adjusters**
  - National Ry. Appliance Co.
  - Westinghouse Tr. Br. Co.
- **Brake Shoes**
  - Amer. Br. Shoe & Fdry. Co.
  - Barbour-Stockwell Co.
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
- **Brakes, Brake Systems and Brake Parts**
  - Ackley Brake & Supply Corp.
  - Allis-Chalmers Mfg. Co.
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - National Brake Co.
  - Westinghouse Tr. Br. Co.
- **Bridges, Steel**
  - American Bridge Co.
- **Brushes, Carbon**
  - General Electric Co.
  - Jeandron, W. J.
  - Le Carbone Co.
  - U. S. Graphite Co.
  - Westinghouse E. & M. Co.
- **Brushes, Graphite**
  - U. S. Graphite Co.
- **Brush Holders**
  - Anderson Mfg. Co., A. & J. M.
  - Columbia M. W. & M. I. Co.
- **Brushes, Wire Pneumatic**
  - Ingersoll-Rand Co.
- **Buildings, Steel**
  - American Bridge Co.
- **Buses, Motor**
  - Brill Co., The J. G.
- **Bushings**
  - National Vulcanized Fibre Co.
- **Bushings, Case Hardened and Manganese**
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
- **Cables (See Wires and Cables)**
- **Cambric, Tapes, Yellow and Black Varnished**
  - Irvington Varnish & Ins. Co.
- **Carbon Brushes (See Brushes Carbon)**
- **Car Lighting Fixtures**
  - Electric Service Sup. Co.
- **Car Panel Safety Switches**
  - Consolidated Car Heating Co.
  - Westinghouse E. & M. Co.
- **Cars, Dump**
  - Differential Steel Car Co.
  - St. Louis Car Co.
- **Cars, Passenger, Freight Express, etc.**
  - Amer. Car Co.
  - Brill Co., The J. G.
  - Kuhlman Car Co., G. C.
  - McGuire-Cummings Mfg. Co.
  - National Ry. Appliance Co.
  - St. Louis Car Co.
  - Wason Mfg. Co.
- **Cars, Second Hand**
  - Electric Equipment Co.
- **Cars, Self-Propelled**
  - General Electric Co.
- **Castings, Brass, Composition or Copper**
  - Anderson Mfg. Co., A. & J. M.
  - Columbia M. W. & M. I. Co.
- **Castings, Gray Iron and Steel**
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
- **Castings, Malleable and Brass**
  - Amer. Brake Shoe & Fdry. Co.
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
- **Catchers and Retrievers, Trolley**
  - Electric Service Sup. Co.
  - Ohio Brass Co.
  - Trolley Supply Co.
  - Wood Co., Chas. N.
- **Catenary Construction**
  - Archbold-Brady Co.
- **Change Carriers**
  - Cleveland Fare Box Co.
- **Circuit Breakers**
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Clamps and Connectors for Wires and Cables**
  - Anderson Mfg. Co., A. & J. M.
  - Elec. Ry. Equipment Co.
  - Elec. Ry. Improvement Co.
  - Elec. Service Supplies Co.
  - General Electric Co.
  - Hubbard & Co.
  - Ohio Brass Co.
  - Westinghouse E. & M. Co.
- **Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)**
  - Brill Co., The J. G.
  - Ohio Brass Co.
- **Clusters and Sockets**
  - General Electric Co.
- **Coal and Ash Handling (See Conveying and Hoisting Machinery)**
- **Coil Banding and Winding Machines**
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
- **Coils, Armature and Field**
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
- **Coils, Choke and Kicking**
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Coin-Counting Machines**
  - Cleveland Fare Box Co.
  - Electric Service Sup. Co.
  - Internat'l Register Co., The
  - Johnson Fare Box Co.
- **Coin Sorting Machines**
  - Cleveland Fare Box Co.
- **Coin Wrapping Machines**
  - Cleveland Fare Box Co.
- **Commutator Slotters**
  - Electric Service Sup. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Commutator Truing Devices**
  - General Electric Co.
- **Commutators or Parts**
  - Cameron Elec'l Mfg. Co.
  - Columbia M. W. & M. I. Co.
  - Westinghouse E. & M. Co.
- **Compressors, Air**
  - Allis-Chalmers Mfg. Co.
  - General Electric Co.
  - Ingersoll-Rand Co.
  - Westinghouse Tr. Br. Co.
- **Compressors, Air, Portable**
  - Ingersoll-Rand Co.
- **Condensers**
  - Allis-Chalmers Mfg. Co.
  - General Electric Co.
  - Ingersoll-Rand Co.
  - Westinghouse E. & M. Co.
- **Condensor, Papers**
  - Irvington Varnish & Ins. Co.
- **Conduits, Flexible**
  - Alphaduct Co., The
- **Connectors, Solderless**
  - Westinghouse E. & M. Co.
- **Connectors, Trailer Car**
  - Consolidated Car-Heat'g Co.
  - Electric Service Sup. Co.
  - Ohio Brass Co.
- **Controllers or Parts**
  - Allis-Chalmers Mfg. Co.
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Controller Regulators**
  - Electric Service Sup. Co.
- **Controlling Systems**
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Converters, Rotary**
  - Allis-Chalmers Mfg. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Conveying and Hoisting Machinery**
  - Columbia M. W. & M. I. Co.
- **Copper Wire**
  - Anaconda Copper Min. Co.
- **Cord Adjusters**
  - National Vulcanized Fibre Co.
- **Cord, Bell, Trolley, Register etc.**
  - Brill Co., The J. G.
  - Electric Service Sup. Co.
  - Internat'l Register Co., The
  - Roebling's Sons Co., J. A.
  - Samson Cordage Works
  - Trolley Supply Co.
- **Cord Connectors and Couplers**
  - Electric Service Sup. Co.
  - Samson Cordage Works
  - Wood. Co., Chas. N.
- **Couplers, Car**
  - Brill Co., The J. G.
  - Ohio Brass Co.
  - Westinghouse Tr. Br. Co.
- **Cranes**
  - Allis-Chalmers Mfg. Co.
- **Cross Arms (See Brackets)**
- **Crossings**
  - Ramapo Ajax Corp.
- **Crossing Foundations**
  - International Steel Tie Co.
- **Crossing Frog and Switch**
  - Ramapo Ajax Corp.
  - Wharton, Jr., & Co., Wm.
- **Crossing, Manganese**
  - Ramapo Ajax Corp.
- **Crossings Track (See Track, Special Work)**
- **Crossings, Trolley**
  - Ohio Brass Co.
- **Crushers, Rock**
  - Allis-Chalmers Mfg. Co.
- **Curtains and Curtain Fixtures**
  - Brill Co., The J. G.
  - Electric Service Sup. Co.
  - Morton Mfg. Co.
- **Dealers, Machinery**
  - Electric Equipment Co.
  - General Electric Co.
- **Derailing Devices (See Track Work)**
- **Derailing Switches**
  - Ramapo Ajax Corp.
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  - Electric Service Sup. Co.
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  - Wish Service, P. Edward
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  - Nat'l Pneumatic Co., Inc.
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  - General Electric Co.
  - Hale & Kilburn
  - St. Louis Car Co.
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  - Ingersoll-Rand Co.
- **Drills, Track**
  - American Steel & Wire Co.
  - Electric Service Sup. Co.
  - Ingersoll-Rand Co.
  - Ohio Brass Co.
- **Dryers, Sand**
  - Electric Service Sup. Co.
- **Ears**
  - Ohio Brass Co.
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  - Amer. Electrical Works
  - American Steel & Wire Co.
  - Roebling's Sons Co., J. A.
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  - Railway Track-Work Co.
- **Electric Transmission Towers**
  - American Bridge Co.
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  - Railway Track-Work Co.
- **Electrodes, Steel**
  - Railway Track-Work Co.
- **Enamels**
  - Beckwith-Chandler Co.
- **Engineers, Consulting, Contracting and Operating**
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  - Archbold-Brady Co.
  - Arnold Co., The
  - Beeler, John A.
  - Bibbins, J. Rowland
  - Byllesby & Co., H. M.
  - Day & Zimmerman
  - Ford, Bacon & Davis
  - Hemphill & Wells
  - Holst, Englehardt W.
  - Jackson, Walter
  - Kelly Cooke Co.
  - Ong, Joe R.
  - Parsons, Klapp, Brinkerhoff & Douglas
  - Richey, Albert S.
  - Robinson & Co., Inc., Dwight P.
  - Sanderson & Porter
  - Sangster, Andrew & Co.
  - Stevens & Wood, Inc.
  - Stone & Webster
  - White Engineering Corp., The J. G.
  - Wortham, Edwin
- **Engines, Gas, Oil or Steam**
  - Allis-Chalmers Mfg. Co.
  - Ingersoll-Rand Co.
  - Westinghouse E. & M. Co.
- **Fare Boxes**
  - Cleveland Fare Box Co.
  - Johnson Fare Box Co.
  - National Ry. Appliance Co.
  - Ohmer Fare Register Co.
- **Fences, Woven Wire and Fence Posts**
  - American Steel & Wire Co.
- **Fenders and Wheel Guards**
  - Brill Co., The J. G.
  - Consolidated Car Fender Co.
  - Electric Service Sup. Co.
  - Trolley Supply Co.
- **Fibre and Fibre Tubing**
  - National Vulcanized Fibre Co.
  - Westinghouse E. & M. Co.
- **Field Coils (See Coils)**
- **Flangeway Guards, Steel**
  - Godwin Co., Inc., W. S.
- **Forgings**
  - Carnegie Steel Co.
  - Columbia M. W. & M. I. Co.
- **Frogs and Crossings, Tee Rail**
  - Ramapo Ajax Corp.
- **Frogs, Track**
  - (See Track Work)
  - Wharton, Jr., & Co., Wm.
- **Frogs, Trolley**
  - Ohio Brass Co.
- **Furnaces, Electric**
  - Pittsburgh Elec. Furnace Corp.
- **Fuses and Fuse Boxes**
  - Columbia M. W. & M. I. Co.
  - Consolidated Car-Heating Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Fuses, Refillable**
  - Columbia M. W. & M. I. Co.
- **Gages, Oil and Water**
  - Ohio Brass Co.
- **Gaskets**
  - Westinghouse Tr. Br. Co.
- **Gas-Electric Cars**
  - General Electric Co.
- **Gas Producers**
  - Westinghouse E. & M. Co.
- **Gates, Car**
  - Brill Co., The J. G.
- **Gear Blanks**
  - Carnegie Steel Co.
- **Gear Cases**
  - Chillingworth Mfg. Co.
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
  - Westinghouse E. & M. Co.
- **Gears and Pinions**
  - Ackley Brake & Supply Corp.
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
  - General Electric Co.
  - National Railway Appliance Co.
  - Nuttall Co., R. D.
  - Tool Steel Gear & Pinion Co.
- **Generating Sets, Gas-Electric**
  - General Electric Co.
- **Generators**
  - Allis-Chalmers Mfg. Co.
  - Westinghouse E. & M. Co.
- **Girder Rails**
  - Lorain Steel Co.
- **Gongs (See Bells and Gongs)**
- **Greases (See Lubricants)**
- **Grinders and Grinding Supplies**
  - Railway Track-Work Co.
- **Grinders, Portable**
  - Railway Track-Work Co.
- **Grinders, Portable Electric**
  - Railway Track-Work Co.
- **Grinding Bricks and Wheels**
  - Railway Track-Work Co.
- **Guard Rail Clamps**
  - Ramapo Ajax Corp.
- **Guard Rails, Tee Rail and Manganese**
  - Ramapo Ajax Corp.
- **Guards, Trolley**
  - Electric Service Sup. Co.
  - Ohio Brass Co.
- **Hammers, Pneumatic**
  - Ingersoll-Rand Co.
- **Harps, Trolley**
  - Anderson Mfg. Co., A. & J. M.
  - Electric Service Sup. Co.
  - Nuttall Co., R. D.
  - Star Brass Works
  - Thornton Trolley Wheel Co.
- **Headlights**
  - Electric Service Sup. Co.
  - General Electric Co.
  - Ohio Brass Co.
  - Trolley Supply Co.
- **Headlining Enamel**
  - Anglo-American Varnish Co.
- **Heaters, Car (Electric)**
  - Consolidated Car-Heating Co.
  - Gold Car Heating & Lighting Co.
  - National Ry. Appliance Co.
  - Smith Heater Co., Peter
- **Heaters, Car, Hot Air and Water**
  - Smith Heater Co., Peter
- **Heaters, Car (Stove)**
  - Electric Service Sup. Co.
  - Sterling Varnish Co.
  - Westinghouse E. & M. Co.
- **Helmets, Welding**
  - Railway Track-Work Co.
- **Herault Electric Furnaces**
  - American Bridge Co.
- **Hoists and Lifts**
  - Columbia M. W. & M. I. Co.
  - Ford-Chain Block Co.
  - Ingersoll-Rand Co.
- **Hose, Bridge**
  - Ohio Brass Co.
- **Hydraulic Machinery**
  - Allis-Chalmers Mfg. Co.
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  - General Electric Co.
  - Westinghouse E. & M. Co.
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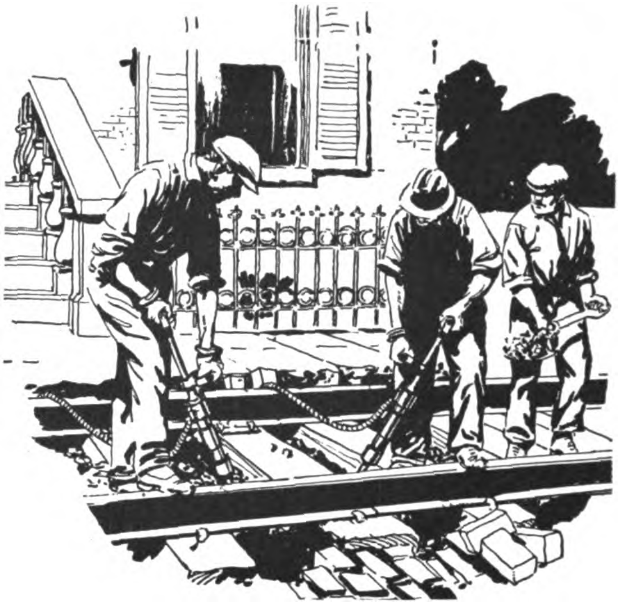

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- Irvington Varnish & Ins. Co.

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- Elec. Ry. Equipment Co.
- Elec. Ry. Improvement Co.
- Elec. Service Supplies Co.
- General Electric Co.
- Irvington Varnish & Ins. Co.
- Ohio Brass Co.
- Westinghouse E. & M. Co.

Insulator Pins
- Electric Service Sup. Co.
- Hubbard & Co.

Insulators, High Voltage
- Lapp Insulator Co.

Insurance, Fire
- Marsh & McLennan

Jacks (See also Cranes, Hoists and Lifts
- Buckeye Jack Mfg. Co.
- Columbia M. W. & M. I. Co.
- Electric Service Sup. Co.

Joints, Rail (See Rail Joints)

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- Brill Co., The J. G.

Junction Boxes
- Standard Underground Cable Co.

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- Anderson Mfg. Co., A. & J. M.
- Electric Service Sup. Co.
- General Electric Co.
- Westinghouse E. & M. Co.

Lamps, Arc and Incandescent (See also Headlights)
- Anderson Mfg. Co., A. & J. M.
- General Electric Co.
- Westinghouse E. & M. Co.

Lamps, Signal and Marker
- Nichols-Lintern Co.
- Ohio Brass Co.

Lanterns, Classification
- Nichols-Lintern Co.

Lightning Protection
- Anderson Mfg. Co., A. & J. M.
- Electric Service Sup. Co.
- General Electric Co.
- Ohio Brass Co.
- Shaw, Henry M.
- Westinghouse E. & M. Co.

Line Material (See also Brackets, Insulators, Wires, etc.)
- Anderson Mfg. Co., A. & J. M.
- Archbold-Brady Co.
- Columbia M. W. & M. I. Co.
- Electric Service Sup. Co.
- Electric Ry. Equip. Co.
- General Electric Co.
- Ohio Brass Co.
- Westinghouse E. & M. Co.

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- Wharton, Jr., & Co., Wm.

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- General Electric Co.
- McGuire-Cummings Mfg. Co.
- Westinghouse E. & M. Co.

Lubricating Engineers
- Galena Signal Oil Co.
- Standard Oil Co., (Ind.)
- Texas Company
- Universal Lubricating Co.

Lubricants, Oils and Greases
- Galena Signal Oil Co.
- Standard Oil Co., (Ind.)
- Texas Company
- Universal Lubricating Co.

Machine Tools
- Columbia M. W. & M. I. Co.

Machine Work
- Columbia M. W. & M. I. Co.

Manganese Steel Castings
- Wharton, Jr., & Co., Wm.

Manganese Steel Guard Rails
- Ramapo Ajax Corp.

Manganese Steel Special Track Work
- Ramapo Ajax Corp.
- Wharton, Jr., & Co., Wm.

Meters (See Instruments)

Motor Buses (See Buses, Motor)

Motormen's Seats
- Brill Co., The J. G.
- Electric Service Sup. Co.
- Heywood-Wakefield Co.
- St. Louis Car Co.
- Wood Co., Chas. N.

Motors, Electric
- Allis-Chalmers Mfg. Co.
- Westinghouse E. & M. Co.

Motors and Generators, Sets
- General Electric Co.

Nuts and Bolts
- Allis-Chalmers Mfg. Co.
- Barbour-Stockwell Co.
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- Hubbard & Co.

Oils (See Lubricants)

Oxygen
- International Oxygen Co.

Packing
- Electric Service Sup. Co.
- Westinghouse E. & M. Co.

Paints and Varnishes (Preservative)
- Ackley Brake & Supply Corp.
- Beckwith-Chandler Co.

Paints and Varnishes for Woodwork
- Beckwith-Chandler Co.
- National Ry. Appliance Co.

Pavement Breakers
- Ingersoll-Rand Co.

Paving Brick, Vitrified
- Nat'l Paving Brick Mfrs. Assn.

Paving Guards, Steel
- Godwin Co., Inc., W. S.

Paving Material
- Amer. Br. Shoe & Fdry. Co.

Pickups, Trolley Wire
- Electric Service Sup. Co.
- Ohio Brass Co.

Pinion Pullers
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- General Electric Co.
- Wood Co., Chas. N.

Pinions (See Gears)

Pins, Case Hardened, Wood and Iron
- Bemis Car Truck Co.
- Electric Service Sup. Co.
- Ohio Brass Co.
- Westinghouse Tr. Br. Co.

Pipe Fittings
- Westinghouse Tr. Br. Co.

Planers (See Machine Tools)

Plates for Tee Rail Switches
- Ramapo Ajax Corp.

Pliers—Rubber Insulated
- Electric Service Sup. Co.

Pole Reinforcing
- Hubbard & Co.

Pole Line Hardware
- Ohio Brass Co.

Poles, Metal Street
- Bates Exp. Steel Truss Co.
- Elec. Ry Improvement Co.
- Elec. Ry. Equipment Co.
- Hubbard & Co.

Poles, Trolley
- Anderson Mfg. Co., A.& J. M.
- Columbia M. W. & M. I. Co.
- Electric Service Sup. Co.
- Nuttall Co., R. D.

Poles, Tubular Steel
- Elec. Ry. Equipment Co.
- Elec. Ry. Improvement Co.
- Elec. Service Supplies Co.

Poles and Ties, Treated
- Bell Lumber Co.
- International Creosoting and Construction Co.

Poles, Ties, Post, Piling and Lumber
- Baker Wood Preserving Co.
- Bell Lumber Co.
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Porcelain, Special High Voltage
- Lapp Insulator Co.

Potheads
- Okonite Co.

Power Saving Devices
- National Ry. Appliance Co.

Pressure Regulators
- General Electric Co.
- Ohio Brass Co.
- Westinghouse E. & M. Co.

Pumps
- Allis-Chalmers Mfg. Co.
- Ingersoll-Rand Co.

Pumps, Vacuum
- Ingersoll-Rand Co.

Punches, Ticket
- Bonney-Vehslage Tool Co.
- International Reg. Co., The
- Wood Co., Chas. N.

Rail Braces and Fastenings
- Ramapo Ajax Corp.

Rail Grinders (See Grinders)

Rail Joints
- Carnegie Steel Co.
- Rail Joint Co.

Rails, Steel
- Carnegie Steel Co.

Railway Paving Guards, Steel
- Godwin Co., Inc., W. S.

Railway Safety Switches
- Consolidated Car-Heating Co.
- Westinghouse E. & M. Co.

Rail Welding
- Railway Track-Work Co.

Rattan
- Brill Co., The J. G.
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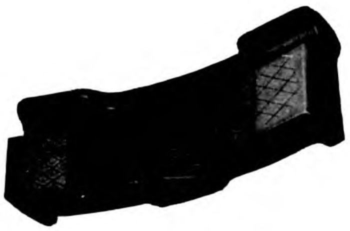

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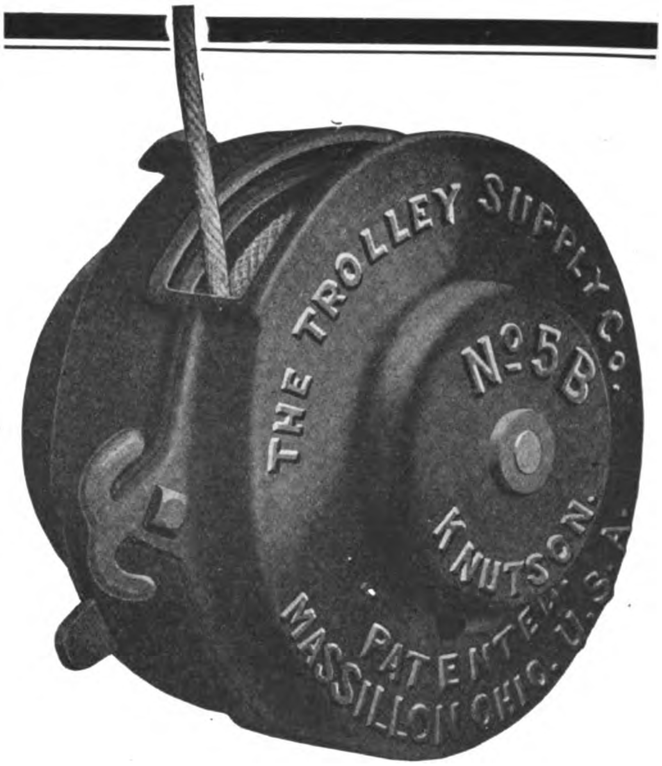

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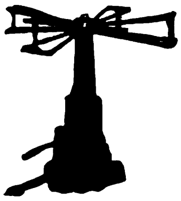

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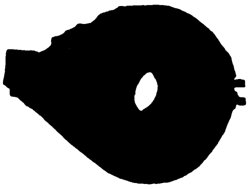

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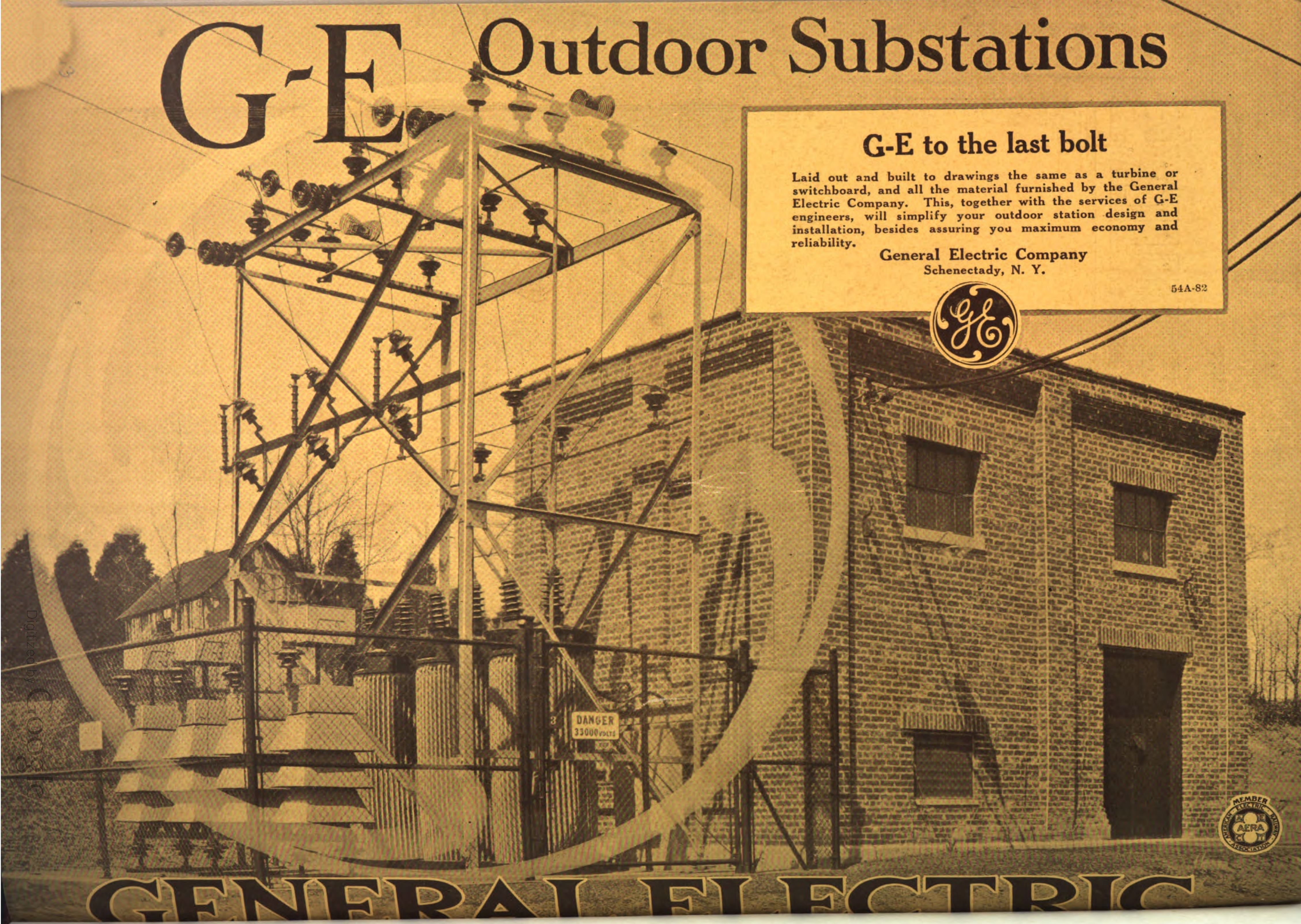

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